Mediality, Temporality, Social Cognition, and Evolution

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Abstract: In the literature of Media Studies, the word mediality has emerged as an expression of the concern about the specificity of media and their link to time, experience, technology and social change. However, mediality is not yet a concept, since the description of the function of media as mediation and transmission has become an obstacle to achieve further developments. In light of these remarks, this paper proposes a theoretical arrangement that gives meaning to mediality by connecting the word into a network of concepts, such as social cognition, evolution, temporality, synchronization and double closure. In order to achieve this goal, the author designs a theoretical apparatus consisting of the self-referential coupling between N. Luhmann's systems theory, H. von Foerster's second order cybernetics, R. Harris' integration linguistics, and A. Clark's extended cognition. A consistent integration and interpretation of the sketched theory, allows us to draw the conclusion that in order to comprehend mediality, it is crucial to understand the relationship between information, double closure, social cognition and evolution, while questions regarding human cognition do not be to be involved; and if that should be the case, research should depart from the problem of the structural coupling between human and social cognition.

1. Introduction

Nowadays, Media Studies are a vast research field. As is usually the case among other scientific disciplines, boundaries are porous and there is a lack of unified methods and theories. However, it is possible to analytically identify two major research traditions within a field that from the beginning has been characterized for its interdisciplinarity and, in some cases, transdisciplinarity [1]. On the one hand, there is a continental tradition rooted in post-structuralist French philosophy and German media theories focusing on the materiality and Eigen-temporality of media and technology (i.e., Media Archaeology and to some extent Media Philosophy) [2]. On the other hand, there is an Anglophone or trans-Atlantic current aiming at describing the social, political and economic conditions enabling the development and functioning of technological media (e.g., Media History, Mass Communication Media Research, Journalism, and Media Sociology, among others) [3]. Furthermore, somewhere in between lies the ambivalent heritage of the Toronto School, headed by Marshall McLuhan (whereby his hypothesis that media are the message and that media have developed into extensions of human senses stand out), Walter Ong and Eric Havelock (both, along with the anthropologist Jack Goody, recognized for furthering our understanding of orality and literacy) [4,5].

The field of Media Studies can also be recognized by the conceptual debates it has brought about. Fundamental concepts such as media, mediation, transmission, storage, technology, temporality, eventness, and multi-temporality are not only analytical tools but also constitute a distinctive language

that not only set the limits of the understandings but also of the discrepancies within this academic domain. For instance, it seems quite common to assume that media "mediate", namely, that they are somehow located between sender and receiver and they work so as to put these parts together. In other words, media are understood stricto sensu as communication channels that transmit information from one point to another (the postal concept of communication) [6,7]. On the other hand, the issue of time has stirred up some debate. Media archaeologists try to emphasize first and foremost the time-criticality of media [8], the temporal behavior of technical processes [9], the need to focus on real time analysis [10], in short, a temporal dimension that is intrinsically bound to the mechanisms (and the knowledge or discourses involved in the making of these mechanisms) making technical media work as they do and, only secondarily, how these mechanisms influence the experience of time in human beings. Media philosophers and other media researchers are mostly preoccupied with how people make sense of the world and how time is experienced when human experience is mediated by mass media or new electronic media [11]. Therefore, there arises some interest on concepts such as contemporaneity, togetherness, eventfulness, and being in time [12,13]. However, time still remains an underdeveloped concept in the trans-Atlantic current [12] (p. 2). In short, there is a kind of divide between the so-called technological determinism and a position that is more humanist in its intellectual background. Last but not least, there is the issue about how to classify media. For those inspired in McLuhan, media have become specialized in certain human senses and there is some kind of historic trend herein (accordingly, it is distinguished between analytic and synthetic media) [13] (pp. 55–59). For those following Kittler, what matters the most is the very materiality of media (thereby, it is distinguished between material and imaginary media) [1] (pp. 41–62), [14]. These concepts, these common places and these debates constitute a language or a discourse that amounts to the paradigmatic structure of the field.

However, since concepts set up what can be considered as a research problem and what kind of answer might fit well and which do not, scientific research is always running the risk of devoting too much attention to ill-defined problems or even of totally missing the point. Of course, it is impossible to tell in advance which the point really is. For that reason, it is very important for science not only to back up theoretical explorations by referring to empirical findings, but most of all to proof the consistency, coherence and soundness of their conceptual apparatuses. There is hardly a better tool for that purpose than comparing theories and/or trying with new concepts and conceptual schemes as if in a conceptual lab [1], so that good theories can be enhanced and what remains useful of unsuccessful theories can be availed of "*providing different points of intervention for thought*" [8] (pp. iv–v).

In light of these considerations this paper aims at exploring an alternative to reassess the field of Media Studies by means of introducing the concepts of *mediality*, *evolution* and *social cognition*. The syntactic structure that will make sense of these concepts in the specific contexts they are intended to be applied to, consists of a brand of the integrational linguistics of Roy Harris [15], the communication sociology of Niklas Luhmann [16], the second order cybernetics of Heinz von Foerster [17] and cognitive science, specifically, the theory of extended cognition put forward by Andy Clark [18].

Media philosophy has put mediality on the spotlight so as to emphasize that it shall be the properties of media what matters the most for further research. However, mediality is not yet an analytical concept, but a research program instead. In contrast to proposals such as the so-called general theory of transmission of Krämer [6] and many other phrasings and definition attempts, this paper aims at conceptualizing mediality by arguing (very close to Luhmannian sociology) that communication is not about transmission and that information cannot be transmitted, but it is bounded to the very communication medium where it is generated instead. Transmission (analogical and digital) is just a technology capable of sending signals through a channel from point A to point B, which happens to have become the basis from which new forms of automated media have emerged (e.g., from phonograph, typewriter, cassettes, etc., to cell apps, social media, and so on) and of which older forms of media have availed of (printing press, oral language, art, among others). Mediality, on the other hand, has to do with the proliferation of information sources and, as a consequence, it is related to the growth of social complexity. Heterogeneous and informative media raise the issue of

the synchronization of asynchronous and multiple time-layered communicative processes—an idea that only can show its full radicalism when an autological description of time [19] is provided. Along these lines, the concept of social cognition develops the thesis that the capacity of communication media for generating and processing information is tantamount to the cognitive capacities of the social system. The other side of the coin, namely, the role of humans, will be described by the concept extended cognition; it represents an alternative to the prosthetics of Marshall McLuhan in explaining the coupling between the human body and the media from a socio-evolutionary perspective. Social evolution, then, will be the overarching framework linking mediality, temporality and social cognition.

In short, exploring mediality, temporality, time, social cognition and evolution from the perspective of second-order cybernetics and the theory of sociocultural evolution of Luhmann, point at strengthening a current trend in Media Philosophy and Media Archaeology characterized by experimenting with concepts and science philosophies inspired by cybernetics and information theories.

2. Some Remarks Concerning the Philosophy of Science

The proposal being advanced in this paper can be better profiled if before dealing with conceptual and theoretical innovation, it first tackles the divergences of theoretical architecture from current trends in Media Studies. In order to achieve this goal, it is necessary to take some critical distance from epistemology, phenomenology and Kantianism.

2.1. Epistemology

Epistemology accounts for the principles and ideas that provide grounding to scientific research. For some, epistemology is tantamount to the philosophy of science; others draw the distinction between epistemology (as a theory of knowledge) and ontology (a theory of the existence of things), arguing that every scientific inquiry ought to account for both. Whatever the case, epistemology dates back to Descartes and his dualist philosophy (i.e., the body–mind problem) carrying prejudices and misconceptions that have continued to plague philosophy [20].

For certain, many scientists and philosophers cannot see a better way to solve the body–mind problem than by resorting to some kind of Cartesian dualism. Others cannot see any alternative to Cartesianism than a kind of Spinozian monism. I do not mean to write yet another page in this endless debate. However, I would like to point out that in the epistemological discourse three different kind of problems, demanding three different solutions, are being conflated into one. These are:

- The foundation of knowledge
- A theory of knowledge
- A theory of human knowledge

Grounding knowledge is not, as Kant would have it, asking for the conditions of possibility of knowledge. It rather equates to a theory of proof, a theory of argumentation or justification. Whoever asks for the foundation of some knowledge is asking for the reasons that allow drawing some conclusion. Therefore, the foundation of some knowledge is nothing but some other knowledge. Knowing, in this sense, is a self-referential communicative procedure that is only important for science and the construction of scientificity—so that for knowledge of this sort to come about a system for science must have already been outdifferentiated. This does not mean that the question of how knowledge is possible is unimportant, on the contrary. But this issue is the proper matter of a scientific theory of knowledge, namely, a theory that ought to have already solved for itself the problem of how to justify and provide scientific soundness to its assertions. For historical (and anthropocentric) reasons the theory of knowledge has occupied itself predominantly with the problem of human knowledge (which is, strictly speaking a subfield of the theory of knowledge) [20] (pp. 12–29, 126, 139–140). Nevertheless, cybernetics, computer science and information theory have considerably broadened the field of the theory of knowledge having as a consequence that cognition (often understood as information processing) is being currently studied in complex systems whether natural (physical and biological),

social or artificial (robotics, Artificial Intelligence, Artificial Life, and so on) [21–27]. Unfortunately, the most underdeveloped branch of gnoseology or cognition science is social cognition—which is still understood as a sort of average resulting from cognition processes carried out by human individuals. In addition, the burden of philosophical concepts such as nature, consciousness, and mind, thickens into a set of common places of which not even the most original cyberneticians have been able to get rid of.

2.2. Phenomenology and Kantianism

Phenomenology has become one of the most popular epistemological foundations in social and natural sciences as well—media philosophers, for instance, often recur to phenomenological approaches and/or concepts. It must be recognized that if one is to ground knowledge on human consciousness and experience, there is hardly a better alternative to phenomenology and transcendentalism. Constructivism, for example, reacts against realism but is easily reconcilable with phenomenology. However, although asking for how humans experience certain phenomena is a legitimate endeavor, this is hardly the single, nor even the best way to conduct social research.

Indeed, constructing an alternative has not been an easy task. The reason is the persistence of the intellectual tradition of epistemology with its confusion of the problems of the recursion of scientific communication (the foundations of knowledge) with the problem of a theory of knowledge (wherein a general theory of knowledge has been usually conflated with a theory of human knowledge). Noticing this difference leads to the recognition that having a single theory embracing all of the three problems is unnecessary. Furthermore, backing up theoretical statements, explaining cognition and accounting for how humans know demand such a degree of differentiation and refinement so as to encourage and support the emergence of new disciplines and theoretical frameworks.

Along these lines, what matters most in the first place is to devise a strategy to provide coherence, consistence, and rigor to the theory or scientific argument being put forward. But how and on what grounds is this possible?

2.3. Self-Referential Foundations and Science as a Communication System

Science cannot have anything but descriptions of the world—stated in some language, whether natural, formal, artificial or even a mixture of them. Therefore, science is an operationally closed system; it has no access to the world and no contact with its environment. However, by means of operational closure it is possible for the system to bring about information of its environment—meaning that the system becomes able to orient itself towards the difference between itself and its environment, with which it becomes structurally coupled [28] (pp. 28–30, 275–280, 307–310, 523–527).

Science produces knowledge (information, as to what its internal states refers) by producing distinctions. The main distinction is that between code and reference: Scientific communication achieves differentiation from other forms of social communication by means of a code (true/not true); and a social system for science gains complexity and reflexivity by distinguishing between self-reference and allo-reference. The next most important distinction is that between code and program. The code deals with the problem of scientific truth, while programs refer to theories and methods as mechanisms for de-tautologizing the code and also as some sort of interface for operationalizing self-reference and allo-reference. As a result of these internal differentiations, the structure of system for science acquires the form of a double closure, both from the standpoint of its operations (what the system actually does, namely, distinguishing and binding communications to communications) and of its descriptions and observations (what the system "says" it is doing, that is, gaining knowledge, advancing science, and so on) [29,30], [31] (pp. 76–83).

At the operational level (basal and processual self-reference), knowledge is actually gained by means of the differences resulting from the contradictions among different theories and methods. Within this framework arises the question of which is the best strategy to design a theory in order to ward off criticism, claim validity and truthfulness.

There are only two possibilities, namely, self-reference and allo-reference. Allo-referential strategies consist in looking for an external element as a source of certainty (e.g., reality to realism, experience to empirism, synthetic apriori for Kantianism, first principles for metaphysics, and so on). Self-referential strategies consist in recognizing, before anything else, the tautological structure of scientific arguments; this idea usually results from observing the historical contingency of allo-referential strategies. The conclusion to be drawn is that scientific arguments can only reach consistency and coherence by becoming self-grounding. However, pure self-reference leads to tautology and tautology alone leaves no room for proof, innovation and error-checking (a function fulfilled in allo-referential strategies by contradiction and verification). Therefore, in order for self-reference to be compatible with the autopoeisis of science it has to develop some kind of consistency proof as a functional equivalent to the notion of reality, namely, the unfolding of paradoxes and/or mutual limitative relationships [16,19,32,33].

The idea behind these concepts (consistency proofs, paradox, and mutual limitation) consists in recognizing that reality is nothing but a communicative construction of the system for science, therefore, the problem of the foundation of knowledge becomes tractable inasmuch as the question of how to fix or arrange the system's internal structure is brought into focus in such a way that redundancy and variety, surprise and expectability, contingency and necessity are simultaneously kept in sight. This can be achieved by building a sort of entangled hierarchy [34] between different self-referential theories or set of descriptions, so that the blind spots of one can be compensated by the insights provided by others, and so that the incompleteness of every one can be balanced by the cooperation with others. Of course, this will amount neither to completeness nor to erecting some kind of super-observer. It just offers a consistent and coherent way to build theories and research paradigms, for contingency and incompleteness are incorporated into the theorization process.

It is noteworthy that the operations of the social system for science take place predominantly within the medium of written language (as said above, natural, formal or artificial). This has remarkable consequences for science and its environment as well, unfortunately, it is an issue beyond our current scope. Suffice it to say, that the latter implies that science operates by means of symbol manipulation. This is yet another way to say, as Rorty did, that "a 'philosophical problem' . . . [is the] . . . product of the unconscious adoption of assumptions built into the vocabulary in which the problem was stated—assumptions which were to be questioned before the problem itself was taken seriously." [20] (p. xiii)—with the exception that the latter is valid not only to philosophy.

To sum up, the present article is backed up by a philosophy of science that conceives foundations as the search for solutions to arrange self-referential conceptual systems into a consistent, coherent, though incomplete, theoretical architecture.

3. Mediality

3.1. The Media Semantic Field

The literature about media has grown so fast during the last twenty years [35] that it can hardly be disputed that the concept of media has become, to put in Koselleck's begriffsgeschichtlichen terms, a fundamental concept of the social sciences. That is to say, the word media has managed to weave together other set of words and concepts into a thick network in such a way that it has become indispensable at the time of providing descriptions (which in the end are also self-descriptions) of modern society [36]. The development of a semantic field of its own (from the family of words medium, media, medial, mediality, mediation, mediatization, remediation, hypermediation to associated words such as transmission, message, transduction, translation, information and so on) as well as the variety of discourses into which it is articulated, speak for the centrality of the concept.

The perspective of conceptual history is also enlightening because it uncovers the force that semantic and etymological criteria exert on theoretical endeavors. As Rorty explains, often "*it is pictures rather than propositions, metaphors rather than statements, which determine most of our philosophical*

convictions" [20] (p. 12), and the metaphor that reigns in the media semantic field is that of communication as a process taking place between two entities whereby one of them sends a message to the other through a channel or medium. Indeed, Shannon and Weaver's mathematical theory of communication meant for an outstanding theoretical development, yet still they relied on these unquestioned and commonsensical assumptions, namely, the metaphor of the messenger, the image of Hermes that Krämer describes as the *postal model of communication* [6] (pp. 20–24, 75–86). But what if those very same assumptions were put into question? In a quite Kantian vein, it is believed that concepts ought to be anchored in intuition. However, where some see intuition a cybernetician would see redundancy in the guise of deep-seated cultural communication structures readily available to facilitate the autopoiesis of the social system—according to Luhmann, that is the function of semantics [37] (pp. 163, 433).

Nevertheless, that the word media has developed into a buoyant semantic field is telling, because this fact can be read as an index of the social transformations undertaken by modern society [38,39]. But, again, we should be careful not to conflate semantic-depth and its concomitant social changes with theoretic-depth. This is precisely the fact that I would like to highlight: In *spite of (or maybe, because of) the semantic richness of the concept of media and of the multiplicity of media theories available, there are few authentic theoretical reflections on media*—not by chance it has been often remarked that media theory lacks of a concept of media [40–42]. By authentic theoretical reflections I mean those not overloaded by semantic affiliations, but guided instead by theoretical decisions (this is, of course, a biased statement: Biased by the incompleteness of our current description, biased by our autological philosophy of science . . .).

What is significant of the word mediality—and about the insistence of many media philosophers, archaeologists, and even sociologists on it—consists in that it points towards the problem of which are the properties, *Eigenschaften*, eigenvalues and/or eigenbehaviors characterizing media. It would be misguiding to face this problem ontologically and ask for the essence of media, for the grasp on temporality, change and contingency would be lost. So, how to conceive of mediality? Or to put it properly: According to which construction rules shall be built the self-referential loop of mediality? Which theoretical decisions [43] (pp. 50–52), [44,45] will guide the selection and arrangements of concepts into a mutual limitation relationship? Let us briefly review what systems theory have to say in this regard.

3.2. Medium/Form: The System-Theoretic Approach of Luhmann to Media Theory

Systems theory has developed three non-mutually exclusive approaches to deal with the issue of its own self-reference, namely:

- Converting the basal self-reference of the concept at stake into a paradox in order to problematize its unfolding [46,47].
- Asking for functional equivalents (i.e., taking the issue at stake as one among many solutions with regard to a determinate reference-problem) [48].
- To focus on contingency as a method consisting in assuming the evolutionary improbability of what is now taken for granted [49] (pp. 17, 113–120).

Regarding this very last point, it is worth noticing that Luhmann developed the distinction of medium/form, precisely, in order to tackle the ubiquitous problem of contingency [50]. The idea behind the aforementioned distinction is quite simple: What is possible (medium) can only become fulfilled with regard to what is currently going on (forms), and what becomes fulfilled (form) opens up a new range of possibilities (medium). To put it in the words of the author, Luhmann conceived of a medium as a set of possibilities (medial substrate or loosely coupled elements) and of forms as concrete and ephemeral realizations of those possibilities (tightly coupled elements) [51] (pp. 102–132).

As shown by Esposito [42] and Baecker [52], the systemic distinction medium/form certainly tackles a state of affairs recurrently highlighted by several media theorists—of which Krämer's idea of

the invisibility of media [6], Grusin and Bolter's logic of immediacy [7] or the gray media of Fuller and Goffey [53] are a few instances. In system-theoretic terms, contingency is thereby the raison d'être of the invisibility of media.

Nevertheless, it seems that the implications of this conception of media with regard to the postal model of communication are far from conclusive. In his oeuvre *Theory of Society*, Luhmann explicitly addresses the question of transmission, insisting that for an observer who distinguishes between medium/form the concept of transmission would be pointless, since there is nothing being transmitted from one point to another [49] (p. 116). However, Esposito argues that the definition of diffusion media (Luhmann distinguishes between two kinds of communication media, namely, success media oriented towards the problem of the acceptance of communication, and diffusion or dissemination media devoted to expand the social range of communication) seems to suggest transmission. Therefore, she proposes to qualify the notion of transmission arguing that:

" ... the medium becomes an instrument of transmission primarily because it can produce its own forms, but transmission is only an aspect, almost a consequence, of a general transformation that modifies the asset of communication. Distant transmission then feeds back on this decomposition into elements and (particularly with printing) fosters recomposition in more complex and unpredictable forms. However, it is not by starting from transmission that one can understand the scope of the transformation and the role of the medium." [48] (p. 15)

In another place Esposito slightly changes her formulation, by saying that dissemination is just a secondary consequence of the potential of the medium for decomposing and recomposing its elements (forms) which cannot be defined neither by the act of shortening time and space nor by any sort of transmission, but by the constitution of an autonomous medial substrate instead [54] (p. 67). But what is this autonomy about? How can it be theoretically supported? Esposito accurately points out the close relationship between the Luhmannian concept of meaning and the distinction medium/form: Both refer to the same state of affairs, namely, the difference between actuality and potentiality. However, while meaning tackles the problem in its broadest dimension, this is, as the whole of possibilities managed by the social system (a world society, in Luhmann's view), the medium/form distinction highlights the fact that possibilities, as paradoxical as it may sound, are given within a delimiting frame [54] (p. 61). Not everything is possible, and not everything is possible at the same time (this is the reason why the evolution of media has strong consequences in the development of the objective or factual and temporal dimensions of meaning). Therefore, in a sense, the evolution of media is tantamount to the evolution of a set of possibilities within a determined social system; it addresses the question of how far social systems can go availing of certain evolutionary path—and as complex systems they can for sure follow more than one at once.

In spite of the valuable insights provided by Esposito, it seems that the socio-systemic theory of media is still in need of further development. It is not clear if transmission, as a concept, shall be abandoned or else redefined. The confusion about transmission, as in other media theories, remains —and this has to do with the problematic relationship between media and technology. My thesis suggests that describing mediality as a property or eigenbehavior of media might point towards a way out of this riddle.

3.3. Mediality against Mediation, Information-Production against Information-Transmission

Mediality is not an original coinage of my own; the word has emerged spontaneously and independently among various and dissimilar reflections on media. The distinctiveness of the word and its working as a scientific concept will depend on the role it plays with regard to others concepts I am about to call upon.

In the first place, it is necessary to take as a premise that all media are communication media. This statement involves the following assumptions:

- Every social behavior is communicative [55] (pp. 48–50), every social manifestation is loaded with meaning. Therefore, communication shall not be limited to linguistic acts.
- Communication can only take place within some communication medium. This does not mean that all communication is mediated, for communication as a process shall be understood as a triple selection of information, medium and understanding (please notice the difference with Luhmann's original definition where utterance—a wording inconsistent and incoherent with the systemic assumptions followed by Luhmann—takes the place of medium, see further [56] (p. 34)).
- Communication communicates. Communication is an auto-catalyzing, self-referential process. From a system-theoretic point of view, communication in any case entails the mental generation of content or information and its transmission through some sort of channel or physiological mechanism from one being to another. Contrarily, this is considered as an excessively simplifying and misguided model of communication—or at least, different systems and diverse forms of self-organization are being conflated as if they were a single process. Communication is an exclusively social operation, while consciousness is an—until now—exclusively human cognitive operation. Although both remain distant in the form of their self-organization, structure and constitution of elements, consciousness and communication are structurally coupled and have been compromised in an evolutionary structural drift during thousands of years [57].

Secondly, the inner workings of medial substrate and their tightly coupled elements is not entirely clear and the very same formulation of loosely coupled and tightly coupled elements is too ambiguous. For that reason, the distinction drawn by the linguist Roy Harris between notation and script might prove of help. According to Harris:

"The relationship between script and notation can be stated generally and informally as follows: The same notation may serve as a basis for more than one script (in fact, theoretically, for any number of scripts). That is why it is important not to confuse the elements of a notation with the (homographic) elements of a script.

It is through its incorporation into a script that an element of notation acquires its value as a written sign in the texts of that system. This is the conclusion Saussure ought to have reached if he had been faithful to his own structuralist principles. That conclusion would have allowed him to recognize and account for such facts as the existence of interlingual homography: E.g., that the letter sequence c-h-a-i-r spells one word in English but a quite different word in French. The members of this homographic pair are differently pronounced and have different meanings, but are nevertheless orthographically indistinguishable". [15] (pp. 91–92)

In order to avoid any sort of confusion, it should be taken into account that the concepts of notation and script refer to functions and not to qualities intrinsic to some element. The problem of homography shall make us aware of this. Another issue deserving attention is closure, namely, both notation and script do not admit but a finite set of elements: Alphabets, numbers, and icons, as the most common forms of notation, all of them constitute limited sets; and scripts, as the (trans)formation rules indicating what kind of operations are valid, are also limited (e.g., the grammar, syntaxes, semantics and pragmatics of certain language, the axioms of geometry, arithmetic's or algebra, and so on).

The relationship between notation and script can be further abstracted in order to account for isomorphic structures in fields other than language and writing. In this sense, it seems that in order for a communication medium to emerge, a mutual limiting interplay between a notation system and a sort of language game ought to be already available. Or to put it another way, the evolutionary chances of communication depend on the double structure and double closure of notation and script; mediality emerges there where double closure arises.

But what does double closure means? The idea of the double closure of communication has been advanced by Heinz von Foerster. Initially, the Austrian cybernetician described the brain as a system

performing recursive operations not only on its own operations but also on its own operators. He used to refer to the geometrical figure of the torus as a model for this kind of (eigen)behavior. For von Foerster double closure was the hallmark of the autonomy of a system [58] (pp. 225, 243–244). But also other types of non-trivial machines, such as communication systems, exhibited the same feature: When two recursive functors (that is to say, a function on functions) were integrated, a double closure emerged having as a consequence that control became reciprocal. Besides, in contrast to hierarchy as the most commonsensical way to think of organization, double closure was intended to become the alternative model for heterarchic self-organization [59] (pp. 317–322)—a more sophisticated and accurate description of complex systems, indeed. In other words, double closure describes the mutual or circular causation relationship between two (or more) circuits or functions.

It happens that double closure is deeply intertwined with the generation of information, for the double loop generated by notations and scripts produces simultaneously redundancy and variety. Double closure is informative because it leaves plenty of room for uncertainty under the guise of novelty, surprise, flexibility, and creativity, although not up to the point where indeterminacy paralyzes communication—however, the price observers must pay is intransparency [49] (p. 40). Double closure is just like a topological and relative stable or negentropic structure of the social system setting the limits or frames where dissipative structures emerge again and again. Or to put it in the parlance of dynamical systems theory, a doubly closed structure (already some sort of attractor) evolves into a strange attractor owing astounding properties (e.g., a Lorenz attractor).

Returning to the systems theory of Luhmann, double closure accounts for the composition and re-composition capacity of media. Notation systems and scriptural rules fix together the range of possibilities or the contingency of a medium. As an outcome, information is produced and media appear as autonomous information sources. It is this informative character of media what I call mediality.

The problem with media philosophies engaged with materiality, such as that of Kittler, is that the analysis only focuses on operations performed on notation systems, with the consequence that those operations are confused with information and that media/ technologies are described as information-carriers [10] (p. 338). Furthermore, Kittler is wrong when he assumes that since data flows consist in nothing more than "standardized series of digitized numbers", a medium can be translated into any other [60] (pp. 1–2). Kittler confuses communication technologies with communication media. There is no doubt that transmission is the apex of communication technologies; however, transmission consists in codifying signals, namely, a trans-notational process that after decoding achieves data transfer from point A to point B, not translation of a medium into other. Transmission as such is not able to deliver information. In order to be able to talk of a communication medium, mediality—as the double closure of notation and script—shall be observed.

3.4. Information, Meaning, Structural Couplings and Double Closure

However, the picture is not yet clear as the concept of information remains unexplained. Although it is obvious that we have relied heavily on Shannon and Weaver's concept of information, there have been so many readings of their *Mathematical Theory of Information* that further explanations are required. Information, as Luhmann would have it, is a two-sided form. The question is: What is being marked on both sides, and what is left unmarked?

Unfortunately, the technology of signal transmission, as formalized by Shannon and Weaver, is as responsible for the development of the concept of information as it is for the misunderstandings about it. Nevertheless, if the question of transmission of signals is left aside for the moment, it can be observed that the concept of information stands in a problematic relationship with the concept of meaning. In some cases, no distinction is made; in some others, the distinctions are so stiff that the three dimensions can hardly be articulated. I just cannot intend to put an end to this debate by drawing some definitions. Notwithstanding, in order to provide a coherent conceptual framework, it becomes inevitable to take up a stance.

Shannon was right about two things: (a) Information is a measure of uncertainty; (b) with regard to the question of transmission the problem of meaning is irrelevant [61] (pp. 31, 48–57). Precisely at point (b) things begin to get confusing, because the postal model of communication prevails as the communication paradigm. The problem of coding a signal, sending it through a noisy channel, and decoding it when the signal is received, is an utterly technical problem. It can be solved resorting to mathematics, physics, engineering ... but this approach leaves aside the social dimension of communication. It meant gaining insight on communication by abstracting communication from its sociological roots. After this analytical breakthrough, when our knowledge about communication needed to be integrated again, it happened that the concepts Shannon and Weaver developed served to deepen the metaphor of the messenger. As a result, the image of Hermes became more sophisticated.

However, if communication is taken as the hallmark of the social, as Luhmann does, both meaning and information are crucial for the success of the autopoietic reproduction of communication—just as Weaver himself recognized [62] (p. 4ff). Haken and Portugali noticed the apparent contradiction between Shannon and Weaver and designed a conceptual framework that distinguished between Shannon information (Shannon entropy), semantic information (meaning) and information adaptation (a cognitive operation consisting in inflating or deflating information according to the context and the available semantic and Shannon information) [27]. This approach has the advantage of underlining the cognitive embodied and contextual dimension of meaning; nevertheless, since the authors are interested in the mind-body problem, cognition is understood as human cognition, in addition, they also conceive communication as a mediation problem between sender and receiver. In order to ground social cognition on an autonomous basis, meaning and information need to be de-mentalized.

Usually, fundamental concepts merely group together very different states of affairs and utterly complex relationships under the same label. This is undoubtedly the case of the concepts of information and meaning. For this reason, the concept of structural coupling, developed by Maturana and Varela [63] and which Luhmann incorporated in his theory, will play a crucial role from here on. Structural couplings describe a relationship of interdependence between two or more systems whereby each of them self-organizes by producing its own structures and operates on the basis of a single and specific kind of operation. As Luhmann repeatedly made the case, the autopoiesis of life is something quite different from the autopoiesis of society, although there cannot be any society without humans. This has been one of the most salient features of the systems theory of Luhmann: Humans are located in the environment of the social system, for society only reproduces communication, neither living cells nor cognitive acts based on the self-organization of nervous systems. These are not only very different operations, but also refer to very different levels of emergence and system-formation [57,64].

So how can the concept of structural coupling help us to think of information and meaning? Harris' thesis that meaning is brought about by means of the integration of what is being interpreted with the broader communicative contexts and activities that the participating subjects carry out [65] (pp. 9–12), will prove fruitful if that integrative performance is understood as an operative coupling enabled by the structural couplings of several complex systems.

However, the concept of meaning is too centered on the medium of language and its performances, for that reason it falls short as a suitable description of the state of affairs being sketched. Besides, although Luhmann himself thought of meaning as a structural coupling among social systems and psychic systems, resorting to the concept of meaning for that purpose is inadequate for one reason: Following Husserl (and also the Weberian sociological tradition) Luhmann thought of meaning as a broader question than that of semantics; when phenomenology was the best theoretical choice available this might have been the right decision, but when Luhmann strengthened the cybernetic roots of his theory, this theoretical decision blinded him to the difference between information and meaning. Therefore, I will describe sense-making not only as the structural coupling between psychic and social systems, but also as the unity of the difference between information and meaning.

Notwithstanding, the concept of a psychic system is quite old-fashioned, indebted to a long discourse tradition of the mind—a language game that our theory has to avoid. As a consequence,

again, a more suitable description is needed. In fact, what are being structurally coupled are two kinds of cognition, human and social. Each of them constitutes a recursive network: Human cognition is embodied cognition, namely, an operationally closed neural network capable of gaining information from its ecological and social environment [66]; social cognition represents the emergent order out of a recursive network of information-generating nodes (media) with the potential to exponentially increase the overall complexity of the system, in other words, the dynamics of media emergence avails of and catalyzes the surplus of communication possibilities a determined social system has access to. The outcome of human and social evolution has been a double closure between social cognition and human cognition. Here, extended cognition has played a crucial role, for while technologies (especially communication technologies) enhance the cognitive performance of humans, that very same development has triggered an autonomous and emergent level of social cognition and memory functions pushed forward with the evolution of communication media and their materiality (Figure 1).
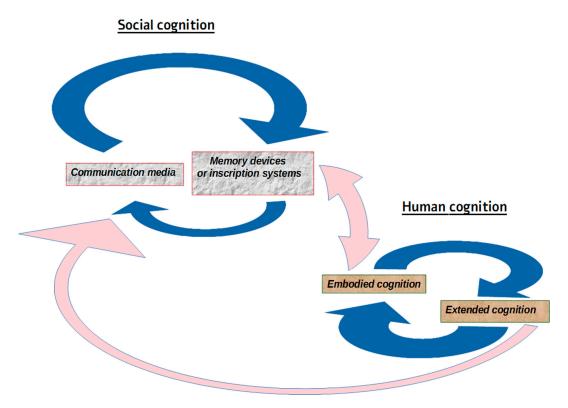

Figure 1. The double closure of human cognition and social cognition as a more accurate description of the structural coupling between social systems and their human environment. In the first loop social cognition feedback upon itself by differentiating between communication media and memory functions—the latter accomplished by material devises and/or material surfaces. In the second loop human cognition entangles embodiment and extension into a positive feedback loop. Both act as couplings to the social environment—although humans can only interact with materialities.

Within this framework information appears in every complex system as entropy, uncertainty, and the balancing of redundancy and variety, for information-processing is a fundamental trait of cognition in general, whether biological (human), physical, artificial or social. Meaning appears instead within the context of the expectations structures emerging from human behavior and language as both: A form of embodied cognition and a communication medium. Herein, expectations structures guide the self-organizing patterns of the social system, as a result, the domain of what is socially possible acquires the character of information; as long as language becomes a touchstone of human behavior and cognition, meaning emerges as the integration or operational coupling between the socio-biological behavior and the communicative emergent level of expectations structures. The unity of the difference,

namely sense-making, refers to the overlapping domain binding together humans and social systems into an evolutionary structural drift.

The perspectives opened up for Media Studies by the latter theoretical description can be stated as follows: The problem of media as such, namely, mediality, can be studied independently of the problem of meaning and the human mind, as a matter of information-processing carried out by the social system—in other words, social cognition. I do not mean that the question of meaning with regard to media is unimportant, but if that will be the point at which research shall focus, then a more sophisticated theoretical apparatus is needed that takes into account the integrative and non-linear processes involved in meaning-generation.

4. Time and Temporality

Information, mediality, sense-making, complexity, all of these concepts are deeply related with the problem of time and temporality. It is not by chance that all of these are properties of complex systems too, because temporality, as I will argue, is also an emergent property of complex systems.

In order to make our point we need to have a clear understanding of how a complex system works. Heinz von Foerster made a great contribution towards the comprehension of complexity by drawing the distinction between trivial machines and non-trivial machines [17,58,59] (Table 1).

Table 1. The difference between trivial and non-trivial machines according to Heinz von Foerster.

Trivial Machines	Non-Trivial Machines
They are whether indifferent to their internal states or their internal states remain unchanged.	Their current internal state is a function of previous internal states and of previous input states and the next internal state is a function of both their current internal and input states.
One-to-one relationship between input and output.	The input-output relationship is determined by previous outputs.
Deterministic.	Probabilistic.
-	Are able to treat their environment as a trivial machine.
Predictable.	Unpredictable.
Analytically determinable.	Analytically determinable.

Non-trivial machines are deterministic yet complex systems, for they are unpredictable. However, there are other kinds of complex systems, such as non-deterministic, far-from-equilibrium, non-linear, and chaotic (or at-the-edge-of-chaos) systems. A significant trait of their behavior is that for all of these systems history matters; they have an own history; as a consequence, they evolve; all of their internal states are transient states. To put it in system-theoretical terms, these kinds of systems temporalize their complexity availing of the fact that not everything is possible and that no everything is possible at the same time [67].

Complex systems organize their redundancy in order to take advantage of the constant flux of novelty being generated, so that a sort of balance between redundancy and variety is achieved. The capacity to organize redundancy or to interrupt interdependencies—that is to say, to delimit a set of possibilities being indifferent to everything else—conveys complex systems with the perplexing property of multi-temporality. In other words, each current operation is able to arrange time-horizons so that different pasts and different futures appear with each operation; as operations can and should be contextualized within a set of possibilities, diverse constellations become possible, even simultaneously [68] (p. 15).

Social systems are an especial type of complex systems for they constitute a hybrid between deterministic and non-deterministic complex systems. For instance, a functional system, such as the social system for science, is deterministic inasmuch as it follows certain transformation rules fixated by its code and its programs. But social evolution is a much broader non-deterministic and chaotic process (such as the level where system-differentiation forms profile and take primacy); evolution, let

us say, enables social systems to change the rules guiding their own evolution. Therefore, temporality acquires even more intricate forms in social systems.

But what is temporality after all? Furthermore, what is the difference between temporality and time? The concept of temporality refers to the organization patterns of the system's operations:

- The simplest temporal pattern is that of a sequence, namely, a succession of inner states.
- Different sequences can run simultaneously in the system, so that simultaneity arises as the main temporal feature of the system. However, as each sequence might be longer or shorter than the other, they also are non-simultaneous—with which one face of the paradox of the simultaneity of the non-simultaneous comes to the fore.
- Since each sequence engenders a set of possibilities to explore further and since that complex systems have the ability to organize their redundancy, multiple time-horizons emerge (for past and future will look different according to which set of possibilities is being actualized) (Figure 2).
- All of these possibilities (even the possibilities of possibilities) take place in the present, namely, one or many current states of the system. As Luhmann would say: Everything that happens, happens at the same time [69] (p. 98).
- Finally, complex systems can gain reflexivity on their temporality by devising a new sort of operation, that is to say, observations and descriptions [67]. In other words, observations and descriptions are operators, namely, operations with the ability to perform an effect on other operations of the system. For example, when the current operation of the system creates a process-identity, namely, it describes itself as part and consequence of previous operations and project future operations in accordance.

So how does time arise? We need to start from the fact that systems can only avail of current operations, and that everything that happens, happens simultaneously. Simultaneity is, then, the point of departure for complexity-building. How? First, the difference between system and environment depends on interdependence interruptions, which is to say, that systems in order to become systems focus on their own selectivity and remain indifferent towards anything else—without prejudice of the capacity of the system to organize its own redundancy [69] (pp. 99–110, 115). Second, simultaneity pushes forward into what Luhmann called meaning-dimensions (sense-making dimensions, for us), namely, temporal, social and objective or factual [37] (pp. 64–93). This means that the social system is forced to translate the rude domain of the possible into something it can handle; therefore, it devises distinctions in order to structure its own complexity. Regarding temporality, social systems distinguish between after and before and, so Luhmann, only in modernity an emerging world-social-system managed to distinguish between past and future, turning the concept of the present from a continuum or transition point between past and future to a non-concept, a blind spot articulating the distinction between past and future [67] (pp. 105–108). Whatever the case, what matters most is, that by drawing distinctions the system becomes able to foster its own temporal complexity; seen the other way around, the semantics of time represent a form to unfold the paradox of simultaneity. Whatever the distinctions drawn, the unfolding of one dimension has consequences on other dimensions (i.e., time can be described as movement if previously an ontology have been devised; tasks can be assigned to be fulfilled at certain moment, if a social dimension has already been differentiated; and as this last example shows, the enrichment of the temporal dimension opens up new possibilities for the social and the objective dimensions).

Along these lines, then, time is nothing but observation and descriptions schemes devised to perform reflexively on the temporality of the system. Time refers to the temporal observation and description of temporality, for sequences, processes and set of possibilities can also be socialized (by means of alter-ego attributions) and objectified (by means of the—conceptual—creation of entities). It is noteworthy that the objectification of sets of possibilities equates to mediality. It is not for nothing that communication media play such a crucial role in diversifying and multiplying time-horizons; also, it is not by chance that media and acceleration go hand in hand in the self-descriptions of modern society.
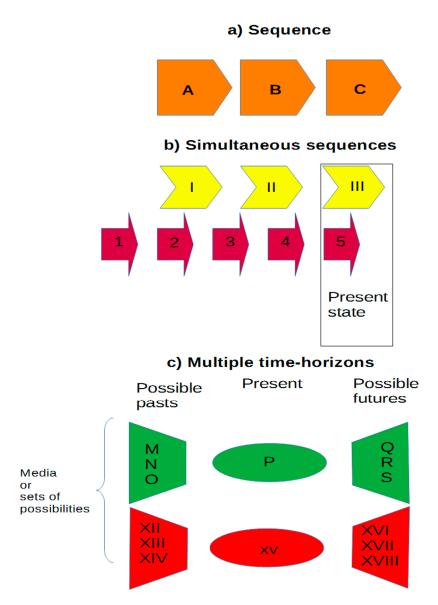
a) Sequence

b) Simultaneous sequences

Present state

c) Multiple time-horizons

Possible pasts

Present

Possible futures

Media or sets of possibilities

M N O

P

Q R S

XII XIII XIV

XV

XVI XVII XVIII

Figure 2. Some temporal patterns produced by the internal states of a complex system: (**a**) Shows the simplest case of a sequence; (**b**) represents, on the one hand, the simultaneity of different operations, and on the other, their non-simultaneity for they own different temporal horizons (represented here as different sequential lengths); and (**c**) pictures the different time-constellations that can be built departing from different (and also, simultaneous) presents—a mere sequence can be formed, but not necessarily, it is just one possibility among others.

Time is self-referential and autological, for every discourse (description/observation) about time already presupposes its own temporality. Another way to put it is that time descriptions (such as present, past, future, after, before, and so on) presuppose time as the unity of the difference being drawn [19]. This paradox is reflected in parlances such as "being in time", "time runs" or "time flies", although the paradox as such remains hidden for time is objectified as a natural chronology or some sort of natural reason. Calendars, clocks, and chronometers do their part deepening the belief that time is a manifestation of nature, backing up thereby the assumption that time is objective. Nevertheless, what is really happening is that the performance of time-measurement devices (along with the beliefs, assumptions and illusions implied in the elaboration of the instrument) is being conflated with temporality itself; what is happening is that natural time provides unity so that further time-descriptions can be consistently and coherently encompassed [69] (pp. 111–112).

What are the consequences of these ideas for Media Studies? First and foremost, communication technologies and communication media shall not be conflated in the same way as time-measurement shall not be confused with temporality. Certainly, communication media rely on a material technological basis, nevertheless, the mediality of the media and the communication techniques (transmission, representation, notation systems) are as different as it is the temporality of media from the temporal technical issues of communication technologies—two different problems that Ernst conflates into what he calls the Eigenzeit of media [70] (p. 241). Communication technologies transmit signals, store data and perform operations on both, but it is just when the triple selection of information, medium and understanding is carried out that social communication takes place.

It must be admitted that complex AI systems are able to process information and might be able to communicate, notwithstanding, what is informative for an artificial cognition system is not informative for a social system—maybe with the exception of the scientists discussing about programming and performance of AI systems, and even though information will look different for both, the artificial and the social system. As a consequence, I am not so sure about what can Media Studies gain by studying the sheer temporality of technical means.

In the second place, the issue of the simultaneity of the non-simultaneous might provide interesting insights into the question of togetherness and contemporaneity. Contemporariness is more than co-occurrence, is more than something that just happens, for simultaneity is problematic as long as raises the demand for synchronization.

Synchronicity is matter of everyday, it arises everywhere, from fireflies lighting at the same time to coordinated social behaviors, making of this issue one of the most pressing in complex systems research. Maybe for that reason, its subtleties and complexities tend to go unnoticed. However, as usual, following the clues of etymology tends to lead astray. Synchronization is not problematic for the reason that things come to happen at the same time; it is problematic as it regards the future states of the system, as coordination becomes a current concern. In natural systems, synchronization emerges almost spontaneously as a result of the behavior of and communication between coupled oscillators [71]. In social systems the problem is more complicated since gentle rhythmical behaviors are not the rule.

The problem of synchronization consists in how time-dimensions overload the social and objective or factual dimensions of sense-making [69] (pp. 117–129); one the one hand, looking to the future, it has to do with risks, dangers, opportunities; on the other hand, a glance at the past burdens the present with information (precedents, lost opportunities, failures, lessons to be learned, and so on) and expectations, so that the present becomes critical (it is often spoken of crisis), pressing, decisions urge, planning becomes a necessity, and it seems as if time accelerates. The question is: What role communication media play in social synchronization? That is to say, how communication media fall upon risk-management, planning, the semantics of crisis, performance evaluations, and decisions (in politics, economy, education, family, organizations, and so on)?

Truth be told, media technologies such as TV, Twitter, Facebook, among others, give rise to a sensation of contemporaneity, of togetherness; they reflect the world-wide simultaneity of the world-social-system; they might even be called synthetic [13] (p. 12). However, communication media, in spite of making simultaneity visible, trigger de-synchronizing effects for the reason that they offer different sets of possibilities that cannot be reconciled because they lead to different paths. It follows that, from this perspective, there are no synthetic media because all media are analytic; only communication technologies might be called synthetic. Otherwise stated, communication media offer such amount of choices for social systems to actualize, having as a consequence that normative expectations fail to control behavior so that consensus becomes utopic (or totalitarian), the meaning of words pluralizes, action becomes performance, interpretations, readings, perspectives proliferate, and so forth. In one word, communication media furthers risks: Risk of misunderstandings, risk of conflicts, risk of disagreements, risk of ignoring what later turns out important, risk of overestimating what later turns out insignificant . . . The resulting fragmentation, as paradoxical as it may sound, seems to make

synchronicity possible and impossible, desirable and undesirable, necessary and contingent, positive and harmful, all at the same time.

In any case, the relationship between communication media, temporality and synchronization represents an interesting field for future research.

5. Mediality, Social Cognition and Evolution

Jarred Diamond begins his amazing work *Guns, Germs and Steel* by addressing what he calls the "Yali's question". Yali wanted to know why white man had so much cargo. Diamond interpreted this question as a matter of inequality between societies. He knew that there were not any biological differences among humans that could account for the difference of performance between literate and illiterate man when carrying out certain kinds of tasks. In fact, he learned that man in New Guinea was extraordinarily adapted to their environment. Therefore, Diamond reformulated the question as follows: How is it possible that in some places societies developed into literate industrial formations while others societies remain as illiterate farming or hunter-gatherers formations? [72]

The answer that Diamond delivers along his book focuses on environmental conditionings such as latitude/altitude, availability of tamable species, accessibility of vegetal species suitable for farming and sedentarism, and so forth. However, how can social evolution be understood not solely in terms of environmental conditions but as an intrinsically social process? What kind of answer could be delivered from a complexity science informed communication media theory?

That literate man outperforms illiterate man, that men using computers to calculate outperform those using pencil and paper, cannot be denied. Nevertheless, thinking of the problem as a matter of individual intelligence is misguiding. As Diamond pointed out, the difference is not about individual cognitive performances; the difference is social, although this is still a quite ambiguous answer. Concretely, the difference is about social cognition. But social cognition does not mean an aggregate of individual performances, it refers to an emergent level of cognition. As argued above, communication media (writing, printing press, computer programming, among others) allow social systems to grow more complex, process more information, develop more technologies, and extend human cognitive capabilities—in this sense, all media are imaginary media [73] (p. 25).

5.1. Extended Cognition

The idea behind the concept of extended cognition is quite simple. Since human cognition is first and foremost embodied cognition—for humans learn by experiencing, doing, manipulating, handling, and for perception is coordinated with behavior to produce experience—when humans delegate to or rely on instruments or forms in their environment for symbol manipulation operations, so that they no longer have to worry about it and focus instead in more complicated and articulated operations, we are dealing with extended cognition. In the words of Clark and Chalmers:

> " . . . It is not just the presence of advanced external computing resources which raises the issue, but rather the general tendency of human reasoners to lean heavily on environmental supports. Thus consider the use of pen and paper to perform long multiplication (McClelland et al. 1986, Clark 1989), the use of physical re-arrangements of letter tiles to prompt word recall in Scrabble (Kirsh 1995), the use of instruments such as the nautical slide rule (Hutchins 1995), and the general paraphernalia of language, books, diagrams, and culture. In all these cases the individual brain performs some operations, while others are delegated to manipulations of external media. Had our brains been different, this distribution of tasks would doubtless have varied." [74] (p. 8)

Although human evolution and social evolution have been structurally coupled for thousands of years, very different consequences to the internal structured complexity and self-organization patterns of each system have derived from that coupling. Human evolution has depended on both, tools and communication technologies, but social evolution has also relied on them. On the one hand,

just as tools improve our performance in transforming our natural environment, communication media enhance our cognitive abilities—albeit, to be more accurate, humans do not directly interact with communication media, they interact with interfaces (and interfaces of interfaces) provided by communication technologies (not for nothing media and technology are usually confounded; media only become visible through the glass of technology and its interfaces). On the other hand, communication media and communication technologies have become unparalleled vectors in sociocultural evolution. Complexity growth could not have had the impulse it acquired, if there were no communication media and communication technologies; in other words, social systems would have remained with little learning capacity.

This approach has deep consequences on the ideas McLuhan sowed about media as extensions of the human mind. In some sense, he was right: Media influence human cognition. However, classifying media with regard to the specific human sense they focus on and accentuate, and from there try to draw socio-structural and evolutionary conclusions, has resulted in a set of far-fetched hypothesis and ideas. There is no causal chain leading from human biology to social organization; both are quite different forms of self-organizing complexity. Relatedness or even isomorphisms shall not be confused either with causality.

For certain, technological interfaces ought to be compatible with human perception mechanisms. In this regard, some important system-theoretic contributions to media theory focus on perception and look to McLuhan for inspiration [52]—and some even point at digitality as a communication medium [75]. Although more cautious and sophisticated, these approaches partially go hand in hand with the ideas in media philosophy that I have been criticizing, namely, prosthetics and the confusion of communication media and communication technologies. I do not think digitality can be taken for a communication medium, despite the fact that it would be hard to deny that its structure is medial; the same is valid for perception. Hereof, it is of the utmost importance to distinguish between communication media and other kind of media—a task still to be fulfilled.

In any case, the point I would like to make is the following: Communication media enhance both human and social cognition; and the theory of extended cognition sheds light on what happens to the human mind when its environment is populated by a diverse ecology of communication media.

5.2. Social Cognition and Social Evolution

I have already talked about the concept of medium in the sociology of Niklas Luhmann, notwithstanding, it has rarely been sufficiently remarked how important is the theory of communication media in Luhmann's theory of socio-cultural evolution. Although Luhmann sketched the general outlines of his evolution theory several times during his career, variations have not been so significant so as to introduce unsustainable tensions and contradictions within his model.

Henceforth, his conception of socio-cultural evolution can be briefly illustrated as follows: Evolution is a self-referential and recursive process constituted by three elements, namely, variation, selection, and (re)stabilization. Social systems are steadily provided with novelty by means of autopoietic reproduction. As long as complexity increases, the sources of variation grow as well (therefore, social systems behave at the edge of chaos when structured complexity is big enough). As a consequence, the function of variation can be fulfilled not only by autopoiesis but also by different structures, such as the medium of language. Following the ideas of W. Ong and J. Goody, Luhmann argues that in segmented social systems language provides steady variation, interaction being the system fulfilling the functions of selection and stabilization at the same time. In primary stratified systems, even though language—with its yes/no code, working so as to increase the possibilities of negation—keeps affording variations, the selection-function is accomplished by normative structures. The result is a social system structured by a negative feedback that holds back the potential disruptive effects of too much variety. Lately, functional differentiated world-society is entirely subjected to the instabilities engendered by autopoietic reproduction. Structures, more than ever, become instable. What matters the most for the system's continuity is autopoiesis. The function of selection becomes

then more subtle. However, communication media play(ed) a significant role in the emergence of modern society. Writing and the printing press de-stabilized stratified society and are responsible for the temporal acceleration characterizing modern time-structures. Success media such as power, truth, and money, on the other hand, have acquired such a degree of structural complexity that the functional systems of politics, science and economy, respectively, have outdifferentiated as an outcome [16], [37] (pp. 162–164), [49] (pp. 113–250), [76,77] (Figure 3).
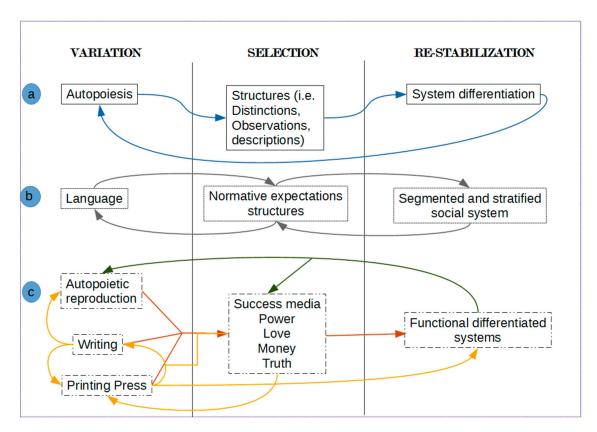

Figure 3. Luhmann's model of socio-cultural evolution: (**a**) Shows the general principles: Autopoiesis is always responsible, one way or another, for variety; selection is performed by systemic structures; and structures that work well persist within the system and reinforce their selectivity; (**b**) accounts for the structural stability of stratified systems; segmented systems, on the other hand, depend on language to perform variations and on interaction systems to select and stabilize at the same time; (**c**) describes modern societies characterized by the primacy of functional systems such as politics, law, education, economy, mass media, and so on; on the other hand, it reflects the complex interdependencies between functional differentiation, communication media and autopoiesis.

The merit of Luhmann consists in articulating systems theory, communication media theory and evolution theory by stressing the axis uniting all of them: Namely, that complexity grows out of the selective management of choices. Systems are the predilect form of organizing and structuring complexity, communication media triggers complexity growth dynamics since it multiplies information (meaning redundancy, possibilities, medialities, alternatives, choices), and finally, socio-cultural evolution is nothing but the enrichment of sense-making with possibilities [69] (p. 108).

What is wrong about Luhmann's scheme of socio-cultural evolution is neither its schematic character nor its abstractness, nor even his supposed mistreatment of the problem of language [78,79]. First, a theory of social evolution cannot help being schematic; second, the sketch of Luhmann is in fact quite Eurocentric instead of abstract—or to put more concisely, graphocentric; third, the critics about Luhmann's description of language miss the point and, in any case, share with Luhmann the

same erroneous semiotics (a matter far beyond the reach of this article; see Harris' argument about the semiotics of writing [15]).

In contrast to the usual emphasis on contingency seen in other places of his oeuvre, the appraisal of writing by the German sociologists seems too deterministic, as if a functional differentiated world-society could have never emerged without alphabetical writing. I am not referring to the commonplace of the difference between orality and literacy whereby scriptism or graphocentrism appears as a critique of the biases generated by a literate culture. The argument is more subtle: It is about putting into question that writing (whether alphabetic, syllabic, or else) is the only communication medium with the versatility to perform symbol manipulation—or, seen the other way around, that any medium that carries out such a kind of performance, as have been roughly the case with the Andean khipu or the Mayan scriptures, should be called writing.

Whereas this is not the place to develop such an argument in extenso, the point I wish to make is the following: Since mediality equates to information-processing performances, mediality is equivalent to the cognitive functions of the social system; every socially available byte of knowledge, can only be accessed to through the glasses of the communication media of the respective social system. The critique against scriptism is important because it dazzles us, impeding the researcher to look at other similar facts as functionally equivalent media. Even though every communication medium is structured differently, and even if their performances differ, they equally contribute to communication autopoiesis and social complexity growth. Hence, media constellations shape social formations and lead to divergent outcomes—pretty much in line with Zielinski's variantology or anarchaeology of media [9]. An approach like this is more sensible to contingency and might provide a methodological assurance against ethnocentrism.

From there on, since mediality unveils itself as a crucial factor in social cognition and evolution, the most pressing question for further research in Media Studies shall be:

- To recognize and identify mediality in divergent cultural contexts—meaning different social formations diverging in complexity and differentiation forms—in this regard, see Fuhse [80].
- To assess differences of performance in information-processing among media developed by different cultures.
- To assess if and how new mediality niches are emerging as a consequence of the development of new technologies such as deep learning, robotics, internet of things, and so on.
- Finally, to study the entanglement between media (as normally understood in the literature) and what Luhmann calls success media (namely, power, truth, love and money), in order to find out how their interaction exerts its influence in socio-cultural evolution.

6. Conclusions

The present article has occupied itself with the proposal of a new language-game, a new theoretical scheme, which goal is to tackle the questions of the relationship of media with time, social change, and history. Along these lines, I have proposed mediality, temporality, evolution and social cognition as the keywords of this new language-game.

The red thread guiding our theoretical exploration has been to criticize the idea that the function of media consists in mediating, mediatizing, negotiating, transmitting, or transducing. Media are not methods of communication; media are, making a concession to McLuhan in a figurative language: Environments for communication. Thinking of mediality as information-production, and consequently, of communication media as a major game-changer in socio-cultural evolution, implies rethinking time and temporality offering new insights into communication media history and media archaeology.

Certainly, communication media have played an outstanding role in temporal acceleration and the making of globality. However, I do not believe that the question of the social transformations pushed forward by media can be properly tackled by resorting to the concept of temporal experience or the (human) experience of time. It is not a matter of denying that, in some sense, humans "perceive

time", but of underlining that time experience is an overvalued and, for the most part, inadequate concept in order to understand time and temporality in the social dimension.

If causation is to retain its rank of analytical scientific concept, it should leave sheer attribution-schemes behind and begin to think in terms of operational closure, self-organization, nonlinearity, and so forth. In other words, the question of the human mind does not need to be enmeshed in every theoretical layout that we devise, for the problem of founding scientific knowledge is something quite different from the questions of cognition, in general, and of human cognition, in particular. Deep inside, Cartesian dualism is responsible for the illusions caused by the metaphors and images of the messenger. I hope to have outlined an alternative way of thinking, though biased and incomplete.

Conflicts of Interest: The author declares no conflicts of interest.

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