

## Information and Communication Science: The Epistemological Status

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### Abstract

This paper investigates the issue of the epistemic situation of information and communication sciences, and tries to discover the reality of the theoretical hierarchy of this new field of knowledge. The features of this new field started to appear in the second half of the twentieth century, mainly in Europe. The study looks also at the interdisciplinary aspects and processes between sciences, and which represents the first characteristic of the field of information and communication sciences. The paper discovers the most important trend which can be resulted from interdisciplinary processes between sciences which is the convergence of sciences. This trends reflects the reality of complexity which requires communication between sciences. The field of information and communication is; therefore, a field of knowledge that continues to build up theoretically and epistemologically in the realm of interdisciplinary processes and convergence. It is also a field that shows strongly the reality of complexity in the information and communication phenomena and other social, mechanical and natural phenomena as well, as mentioned by Edgar Morin.

**Keywords:** Epistemology interdisciplinary; Convergence of science; Information and communication science; Media convergence complexity

### Subject of the Study

This research is interested in how to form the Information and Communication Sciences as an open field of research and had increasingly concern of it during the last decades of the twentieth century. It also studying the fact of Inter disciplinary between information and communication sciences and other humanities and social sciences. The research poses the complexity problem as epistemological issue and biological and physical philosophy that occupies information and communication sciences and requires thinking in the governance of science in order to find solutions to the problems that facing our societies in different levels.

### Problematic

When we talk about information and communication studies, can we talk about a scientific discipline that stands on its own; independent sciences like physics or mathematics or linguistics? Or the issue concerns a domain opened for research, attracting a score of knowledge paths? How did this domain or this science, which begun to be known in European academic circles, and in France particularly as Information and Communication Sciences, shape up and form? What is the epistemological status of media and communication? And what is the truth of research methodologies researchers of this domain are talking about.

### The Theoretical Framework

To understand the epistemological foundation of information and communication sciences and know of its location on the science's map, we have adopted a systemic approach trying to know the complexity paradigm of complexity, which is strongly posed in the field of science. It is known that this approach also allows studying the cases in its complex environments and enables the student to understand the level of interactions between the studied subject and his environment.

We had started with our predecessors' works to discuss the Epistemological status of Information and Communication Sciences. Works of them are little and scattered between scientific articles<sup>1</sup> and small number of books, the most important of them is for Robert

Boure<sup>2</sup> and international conferences and discussions. We have found difficult to describe the history of information and communication sciences regarding its theoretical and institutional dimension due to absence of an official history for this interdisciplinary field.

Because of this difficulty, we have used the academic lessons and knowledge that we have been taught before by our professors in the field of information and communication<sup>3</sup>, they have contributed to the establishment of Information and Communication Sciences as well as the foundation of the French Society of Information and Communication<sup>4</sup> among of them is Escarpit Robert, Laulan Anne-Marie, Tudesq Andre-Jean, Estivals Robert, and Meyriat Jean<sup>5</sup>.

Also we have invested the academic relationship that allowed us to meet Laulan Anne-Marie the later in the late eighties and early nineties of the last century, Laulan Anne-Mari as a founding member of the French Association for Information and Communication Sciences has taught us to know the early stages of Information and Communication Sciences establishment, These stages represent according to Laulan in the appearing of volunteers partnerships of different knowledge fields

<sup>1</sup>Revue française des sciences de l'Information et de la Communication (French magazine in information and communication sciences), SFSIC.

<sup>2</sup>Boure Robert, Les origines des sciences de l'Information et de la Communication: Regards croisé, Ed. Robert Boure, 2002.

<sup>3</sup>Abdallah HIDRI, L'Information Politique télévisée en Tunisie, University of Bordeaux III, Talence 1967.

<sup>4</sup>The SFSIC was created in the mid 1970 by the will of some academics and researchers including Escarpit Robert, Barthes Roland and Meyriat Jean.

<sup>5</sup>Escarpit Robert (Linguist), Laulan Anne-Marie (sociologist), Tudesq Andre-jean (Historian), Meyriat Jean, (Political Science), Estivals Robert, (linguiste).

<sup>6</sup>Edgar Morin, Introduction a la Pensée Complexe, Seuil, 2014. Robin Fortin, Comprendre la Complexité, Introduction a la Méthode d'Edgar Morin, Les Presses de l'Université Laval, 2005.

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and different universities, they think that there is a joint scientific problems should pay attention to it within a new field of knowledge called “new humanities”.

Concerning the theoretical issues which related to our work like the issue of complexity, the issue that strongly posed in many of American, European, scientific and academic communities, for example, Washington Center for Complexity and Public Policy, Institute of systems, complexes Paris (Institut des systemes, complexes de Paris), scientific literature of this concern had focused on the issue and its philosophical, physical, biological and epistemological dimensions. There is no direct concern regarding the issue of complexity in the field of information and communication, but paradigm of simplicity is prevailing in this field, therefore our dependence confined in this research on some philosophical works of Morin<sup>6</sup> and sport works of Wiener<sup>7</sup> especially in the field of Cybernetic.

We can say that the scientific concerns and epistemological theory the field of information and communication does not attract those are out of this major and researchers and experts who are belong to this major are mostly tend to the simplistic approach that may help them as they think to practice power and decide.

## Epistemological Status of Information and Communication Sciences

In order to have Science, there must be a consensus between scholars and scientists. Talking about science as a social institution, Pierce<sup>8</sup> argues that objectivity is transformed into inter-subjectivity. This can be explained, in our context, by the fact that the theoretical, historical and institutional perspectives of information and communication sciences interested only scholars and researchers from within the field, contrary to what is happening in other sciences and specialties. This is because of objective considerations, summarized by Robert Bouré [1] as follows: the relatively young age of this field in which founding works and the few epistemological and theoretical studies failed and were not able to draw clear theoretical borders for it.

As Daniel Bounoux [2] commenting on communication, put it: It's a reality which is found in all sciences, however, as a science it's a lost reality. In addition, the explosion of research methods and approaches inside this field, which emigrated from other historically well rooted disciplines in history, made the task for those working on the history of media sciences, scrambled and complex.

The clear borders of a science are highlighted by research revolving around the quest of its close and far away origins, which are rooted deeply in the study of its theoretical and scientific founding assumptions, to discover the basics of scientific research and its trends, and the development of its stakes and its problematic structure, as Pierre Boutroux put it [3]. The achievement and realization of such work was indeed, complex, hard and elusive, in the case of media and communication sciences, in spite of what have been achieved in this field in terms of founding and originating studies<sup>9</sup> to build up a new

structure of thoughts that may give it a legality of a science. This can be explained by two main reasons: The first one revolves around the duality of the process of building up in this field, and the second reason is the interdisciplinary nature of this new field which can be summarized in the theory of media and cybernetics, the theory of structural linguistics, pragmatism, and modern sociological and philosophical approaches.

## Complex Duality

The complex duality of “Information and Communication” is the cause of perturbation and confusion whenever it comes to the history of media and communication sciences, as a field in search of establishing a scientific and historical identity. It also affected deeply the development of its methodological and intellectual bases. In this context, Hubert Fondin<sup>10</sup> argues that researchers in information and communication sciences face a big difficulty to explain the various processes and phenomena related to their field. This is can be explained, in our view by the duality contained in the word media “Information” and “Communication”, two related and separated fields at the same time: First the field of the media and information industries, and this is the field known as “Information”, which was approached by various intellectual and theoretical currents. Among the most famous of them, we can cite “Functionalism” school, which looked at the roles of mass media and their impacts in society. This trend believes that ideas cannot spread out and cannot be transformed into determinant and effective powers without mass media. On the other hand, one cannot assume that the media have an absolute impact. Scholars representing this trend are Wilbur Schramm, Paul Lazarsfeld, Bernard Berelson, Harold Lasswell. Although Lasswell in his communication model and his five questions, exaggerated the role of media in having an impact on society as he is assuming that the media have an absolute impact.

On the other hand, one find the critical theory represented by members of the Frankfurt school<sup>11</sup> such as Max Horkheimer, Theodor Adorno and Herbert Marcuse. This school of thought criticized the delinquent practices of the mass media for their unconditional support to the dominating forces in society and their negative coverage of high quality cultural works. There is also the linguistic structuralism<sup>12</sup> as a methodology vested into getting out levels of media content analysis. The works of Roland Barthes [4] and Christian Metz [5] make an essential entry to put a new typology for the image in the media. The works of Sanders Pierce, the founder of the Pragmatic trend<sup>13</sup>, gave the field a new approach to the perception of what is called semiosis<sup>14</sup> within a semiotic logic that encompasses all the phenomena.

From another view, one finds the modern philosophical trend<sup>15</sup> represented by Jean Boudrillard, Gilles Deleuze, Jacques Derrida and Michel Foucault among other philosophers of post modernism who were interested in the study of the fabrication of reality by the mass media. Boudrillard [6] worked specifically on analyzing the media reality through dismantling it from the reigning rhetoric masks in the media game, in order to have a second look at its creation and

<sup>7</sup>Wiener Norbert, *Cybernetics :Or Control and Communication in the Animal and the Machine*, 1965.

<sup>8</sup>Charles-Sanders Peirce, *La logique de la Science*, article publié dans *La Revue philosophique de la France et de l'étranger*, troisième année, Tome VI, Décembre 1878 et quatrième année Tome VII Janvier 1879

<sup>9</sup>These works were produced and shared through different periods, and appeared in the form of approaches, and through different schools and currents of thoughts. See : Axel Mucchielli, *La nouvelle Communication : Epistémologie des sciences de L'Information*, Armand Colin 2000.

<sup>10</sup>Hubert Fondin « La science de l'information : posture épistémologique et spécificité disciplinaire », *Documentaliste-Sciences de l'Information* 2/2001 (Vol. 38) pp: 112-122.

<sup>11</sup>Rolf Wiggershaus, *The Frankfurt School: Its history, theories and political significance*, Mitt Press, 1995, 787p.

<sup>12</sup>This current was materialized and seen specifically in the works of the linguists who belong to the Prague Linguistic Circle which developed the complex linguistic analysis methods. Pioneers of this current are: Roman Jakobson, Nicolai Troubetzkoy and Sergei Karcevski.

<sup>13</sup>The pragmatic philosophy was initiated by the philosopher Pierce. This philosophy linked thought and work and called for the value of any idea resides in its practical profit.

<sup>14</sup>Semiosis: One of the basic concepts of Pierce semiotic theory, known as pragmatic theory.

<sup>15</sup>See: François\_Cusset, *French theory. Foucault, Derrida, Deleuze and Cie et les mutations de la vie intellectuelle aux États-Unis*, La Découverte, Paris, 2003.

to redefine it. Derrida [7] one of the mentor of the disintegration philosophy, worked on the dismantling of the centers of influence and scientific, ideological and media domination, and called for working on a new construction against the "construction"<sup>16</sup>.

The second field concerned about the complex duality mentioned earlier, is the domain of behavior and social interactions known as the field of communication which becomes to encompass everything on earth as explained in the works of the Palo Alto group in their systemic approach of the human behavioral patterns as a communicational behavior. Wilkin, one of the founders of the Palo Alto school, defines communication as: "Communication. Terme irritant: c'est un invraisemblable"<sup>17</sup> (Communication is an irritating term; it is an unbelievable dump in). The clear significance of the definition lies in the fact that communication, besides it encompasses everything in life, doesn't have an opposite, like the impossibility of not communicating<sup>18</sup>. Communication is a complicated complex reality that cannot be approached from one single angle.

In the context of this thought, a pragmatic reading of communication was developed by Watzlawick, Bateson, Haley and Jackson who made their school, namely Palo Alto a rich reference in media theories. There is also the interactive trend<sup>19</sup>, represented by Erving Goffman and Louis Quere, who consider the social issue as a result of inter-subjective actions between members of society (inter-subjectivity). The social action, according to this trend of thought is a construct based on inter-subjectivity through the use of language. We find the seeds of this thinking in the critical philosophy of Kant [8], which later on was invested and exploited by a generation of philosophers such as Fichte, Hegel, Popper and mainly Habermas in his project to build up the theory of Communicative action [9]. Habermas developed the theory of public sphere which represents in his philosophy a field of attraction for it is an essential confluent from the confluents of communicative action.

Let's get back to the issue of communication and separation in the field of media studies and communication to clarify that the components of communication show integration and intersection in the original significance of the words "media" and "communication". Each news -media- is imperatively an action of communication. On the opposite, we find that any communication action can be a news -information- action, and can be something else. All the languages agree on this assumption. Robert Escarpit [10] clarified this level of integration in his critique of Shannon mathematic model of communication and the linear models in general. Escarpit considered what happens in news media is a way of communication, and the media in this case remain from a sociological point of view in all of their steps, one form of communication forms, while from a mediated point of view communication remains a media pattern. Escarpit refuses the segmentation of the two domains: media and communication; he insists on not to separate them, and he holds on to build an independent

global theory for media and communication sciences as a scientific field open and independent in the same time.

Jean Meyriat and Anne-Marie Laulan<sup>20</sup> agree fully with Escarpit, and consider that communication cannot have the characteristics of science unless it encompasses media as an independent field. Bernard Miège talks about the different grounds of media sciences and communication sciences, and in the same time he mentions that there are meeting points and a kind of proximity that is gaining in importance in the two fields, lately<sup>21</sup>. Daniel Bounoux presents the image of integration in a different way. To him the two fields contain each other. He looks at communication as a process whose content is media, which means the correlation of the private with the global and the containment of the private by the global. Bounoux shows a dangerous issue concerning the interrelated relation that is going to lead to a reality where communication will dominate media. In another context, he makes a distinction between the two, as we will see later. This is how the overlap takes place between the two fields and how it changes in some of its levels to a form of full convergence.

Concerning the separation concept it appears at the dependent significance of the words "information" -media-, and communication, because the word "information" means in French communication literature a field in itself, set by Fernand Terrou and Pierre Albert within three integrated systems formed of broadcast organizations from one side, and media equipments used in the production, broadcast, transport and diffusion from another side, and finally the media production in itself. The word "media" in English literature, the same meaning with a difference in the appellation that the word mass media stills conserve. This means that the word media (information) as a communication act, is a process restricted to convey and inform; while the word communication leads to more global meanings than those of the word "information". This holistic aspect of the word communication appears clearly at the theoretical level, in borrowing "orchestra" from which modern models of communication got their origins and Paul Watzlawick the theory of systemic interactivity. The holistic aspect of the concept appears through linguistic communication models of De Saussure and mainly Jakobson who focused on the role of the context and its importance in communication which remains, from understanding the context, more constructed and more complex. In this regard, Jakobson argues "There are two sources to explain the sign, the first one is coding and the second one is context" he also stresses on "It's not enough to know the coding to understand the message... we need to know the context". If we admit that there is for every meaning a context, the meanings of communication remains floating in an infinite net of contexts. Michel Foucault uses the expression "the knot and the net", in a different context, to show that there nothing happens away from a system of complex far away and direct external relations.

The holistic aspect of communication increased in clarity and complexity, in philosophical and anthropological approaches, as well as approaches of sociology, psychology, and other approaches that took communication as their subject. The interest of sciences in the subject of communication is not due to its importance as a subject for these sciences, but for being holistic as a global reality seen anthropological and mathematically in human, animal and mechanical systems,

<sup>16</sup>Derrida, in an interview with Antoine Spear, translated by Ahmed Othman. Interview published in Awan magazine, issues 3-4, 2003:32-33.

<sup>17</sup>Y. Winkin, La nouvelle communication, Seuil 1981, p 13, 372p

<sup>18</sup>Watzlawick.P & others, Une logique de la communication. Seuil, 1972, 260p. p 45-46.

<sup>19</sup>A wave of thought appeared in the United States of America in the beginning of the second half of last century. It started with a confrontation between different currents originating from psychology, anthropology, sociology, and information and communication sciences which was not known by this name at that time. This current of thought considers man as the product of his environment and not the product of his instincts.

<sup>20</sup>Meyriat and Laulan, faculty members at the University of Bordeaux in France, contributed with Escarpit in founding what became to be known as Information and Communication Sciences in France.

<sup>21</sup>Jean Meyriat and Bernard Miège, 2002. « Le projet des SIC: de l'émergent à l'irréversible (fin des années 1960—milieu des années 1980) », pp. 45-70, in: Robert Boure (dir.), *Les origines des sciences de l'information et de la communication. Regards croisés*, Lille: Presses universitaires du Septentrion.



which lead us to say that communication as a field of knowledge, is the one which got interested in other sciences, and get it to its circle, and this what made its theoretical field difficult and complex. That why Dominique Wolton comments on this difficulty by saying: "Communication cannot be a science and cannot be transformed into a theory, it's simply a meeting point of theories". Bernard Miège goes in the same direction and doesn't believe in the possibility of building a general theory of communication; to him it's a total myth to believe in such thing. Lucien Sfez talks about the ideology of communication and rejects it as a dominant thought in modern societies, and wonders if it is possible to have a way to form a science of communication as a systemic field without history nor epistemology. Philippe Breton and Serge Proulx believe in constructing the science of communication at one condition, separating science and technology, and science and ideology, and forget for good, the establishment of a unified general theory. Bounoux in his "debate" about information –media-, and communication doesn't seem to separate between the two fields by drawing clear borders between them, he doesn't also totally assemble them as Escarpit did in his general theory of information and communication, but we find him make a kind of confrontation between the two fields where communication wins as a dominant ideology. From the widening of the circle of significance of communication, and the sectioning of its approaches, appear the separating borders between communication and information, in spite of the fact that there are some limits of concordance and convergence between them.

### The Interdisciplinary Situation

Most of scholars and researchers<sup>22</sup> in the field of information and communication agree that this field doesn't represent a science in itself, however, it can be considered as an open field of research, founded through the intersection of various sciences such as Cybernetic, mathematics, physics, sociology, social psychology, and linguistics. Dominique Wolton counts no less than ten sciences that he sees as the main components of information and communication sciences [11]. He cites anthropology, philosophy, history, political sciences, law, sociology, psychology, economics, social psychology, and linguistics. Breton and Proulx consider cybernetic as the "big bang" that supported the belief that there is an independent global science that has a macro theory [12]. This is true, mainly on epistemological construction level, because cybernetic as a science for communication, and the control of the animal, human and mechanical systems, was behind the inter-disciplinary process between sciences, from one side, and the lining up of communication theories in the field of information and communication sciences, from the other side.

The interdisciplinary aspect of media and communication sciences appears clearly by investigating the early founding works<sup>23</sup> of this field, because the first founding basis differed according to the differences in the academic and scientific traditions in countries of the world. For instance these traditions in America are different than those of the

United Kingdom; and those of Germany are different than those of France. We will describe the French case.

The first founding experience of information and communication sciences in France started from the university of Bordeaux in the beginning of the seventies of last century, when Robert Escarpit gathered a score of researchers and scholars who belong to different scientific fields, to form a scientific body for communication in a multidisciplinary unit of information and communication sciences (UPTTEC), like the body he established at that time in comparative literature, since he was a writer and a novelist. This unit got gradually university professors from different specialties such as Anne Marie Laulan from sociology, Andre Jean Tudesq who is specialized in the history of the press, Jean Meyriat specialized in information and documentation, Roland Barthes specialized in semiology, Quemada specialized in linguistics and Elie Roubine from physics.

With the continuity in its endeavor, this unit's work got increased attention despite the fact that it didn't have a concise scientific objective. In fact, its members were interested in deepening the dialogue about a new field of research. Some philosophers and university professors were following closely the activities of the unit which started to attract numbers of academicians from different scientific specializations such as Edgar Morin and Abraham Moles. An institutional and academic frame for information and communication sciences was shaping up and taking form<sup>24</sup>, which reflects clearly and from its beginning, the reality of inter-disciplinary aspect that characterizes this field and from which it gets its scientific credibility.

The epistemological map of information and communication sciences made out of it a field that hosts different scientific specializations and many sciences interact with it, reflecting therefore, the idea that "everything is communication" as announced by the Palo Alto group. If we examine the scientific biography of some of the founders we will find its homogeneity with the reality of the inter-disciplinary aspect of media and communication sciences which we mentioned earlier. Abraham Moles, for instance, is a social scientist, specialized in mathematics, and also in verbal and written techniques of communication, Robert Escarpit, a social scientist, specialized in English literature, writer, and journalist. This means that scientific phenomena needs to have scientific concepts, a dialogue between sciences, or a form of convergence between sciences, because sciences, as it developed in isolation, emerge and proliferate in convergence. Talks took place in the second part of the twentieth century about the convergence of sciences [13], as a societal and scientific choice to develop science and to find solutions to the problems of society. What is the truth of this choice and how information and communication sciences interacted with it.

### Information and Communication Sciences between Inter-disciplinary and Convergence

The history of sciences didn't witness the convergence between various fields of knowledge, but sciences through its history didn't work in isolation, the sciences of languages, for instance, interacted between them. Mathematics and physics united since Abu Raihan Al-biruni discovered that earth pivots around itself. Physics remained mathematical physics since Galilee suggested the translation of natural

<sup>22</sup>We mention in particular: Escarpit Robert, Anne-Marie Laulan, Abraham Moles, Manuel Castells, Dominique Wolton, Roland Barthes, Francis Balle, Daniel Bounoux, Yves Wikin, Armand Mattelart.

<sup>23</sup>Among this works, we mention: Fleury B., Walter J., 2007, « L'histoire des sciences de l'information et de la communication », *Questions de communication*, 12, pp. 133-148.

Miège B., 2007, « Sur le positionnement de la recherche en histoire des SIC », *Questions de communication*, 12, pp. 191-204.

Robert Boure, *Les origines des sciences de l'information et de la communication, regards croisés*, Lille, Presses universitaires du Septentrion, coll Communication, 2002, 179p.

<sup>24</sup>With the beginning of the seventies, the efforts of the body – committee- formed by Robert Escarpit resulted to the academic recognition and became known as the information and communication sciences body (committee). Starting from 1974, its name changed to the French Association of Information and Communication Sciences.

phenomena to mathematical equations. Human sciences followed on the path of natural sciences despite its special epistemological aspect. Philosophy remained in Descartes's era the unifying science of all sciences.

Sciences didn't work in total isolation; otherwise it would not have developed from the times of prehistory till today, and achieved stages of knowledge to understand the world. On the opposite, it did not converge in an anthological meaning of the word, to face the stakes of thought and perceive the complex phenomena in reality, despite of the wave of convergence that floods today more than a sector. Today talks take place on the convergence of communication networks [14, 15], and the convergence of business sectors, and the convergence of market oriented services [16], and the convergence of the social individual [17].

But why the convergence of sciences? What does the act of convergence mean in our field? And what is the situation today? Is it the specialization in all the specializations and the encyclopedic knowledge, or is it an investment and the use of what can form a common base among sciences as is the case of the science of languages and social sciences, or between mathematics and physics for instance? Can we consider the organization of sciences and its overlapping of form of convergence? What are the expectations of science from the convergence of sciences? Does convergence require, if we believe in its indispensable and necessary occurrence, the invention of new methods in research and education? How can we handle the problem of the convergence of information and communication sciences with other sciences for the sake of our specialty in this context?

### The Posed Stake of the Convergence of Sciences

In the last two decades the attention in the subject of the convergence [18], of sciences emerged as an issue that concerns all society. In the European scientific circles, thought is oriented toward the participation of social individuals in the processes of scientific research through the control of the objectives of science, its characteristics and its applications in society. If science presents solutions, according to the expression of Jean Michel Cornu [13], who poses the problems? In this context, society is being trained to qualify to be able to express its opinions about issues concerning science and society. In Brazil, for instance, in addition to teaching and scientific research, university professors started playing a new role which consists of diffusing science and knowledge outside the walls of universities and laboratories in order to build a true dialogue about the stakes of science and technology. A society that advances is a society built upon the democracy of knowledge and in which scientific research is a field that produce knowledge, and the decision that rationalizes the movement of social change.

The integration of society in the arena of science is one of the prerequisites of the convergence of sciences, because the question of the unity of sciences and its convergence, even if it is basically a scientific issue, we will get back to it later on to explain its direct causes, it is also of a distinct political and social nature. Because the convergence happens to serve social purposes in the first place, and to achieve strategic goals linked to different environmental and geo-politic contexts [19], to be discussed about its importance and perspectives in a large societal context. From this starting point, it seems that the convergence of sciences is a choice made by society which strives to achieve it through training and research institutions. In this context, we talk about applied convergence, which the kind that requires the mobilization of qualified people and efforts to achieve important

applications that serve the faces of the world that society wants, like the dedicated local and international efforts to save environment and the earth bio-diversity, or those invested efforts to discover the secrets of the universe.

From another side, we find that the thinking about the convergence of sciences stems from a complex theoretical epistemological reality in which two truths interact: The truth of inter-disciplinary process between sciences, and the truth of the appearance and emergence of the paradigm of complexity [20]. The first one is based on the overlap between the fields of sciences which use the same concepts. Edgar Morin talks about the migration of concepts from one field to another. Concepts do not hibernate the fields in which they were born, and do not stagnate in their first homes. But they live their homelands to stay in more than one field of knowledge, and grow in it. Some of migration processes occur in a secret way without control. As an example, we have the concept of "information" which was born in an environment of mathematics and physics, then it emigrated to various fields, among which human and social sciences, biology, and robotics which allowed it to have basic significant structures in each field. We find also the concept of noise which moved from the field of physics to the field of human sciences, and from talking about technical noise in physics to the talk about semiotic noise or semantic noise in media and communication sciences as well as in other social sciences. There is also the concept of entropy which originated in thermodynamics to remain later on a central concept in the field of media and communication to measure the importance of information and news exchanged and consumed in the social environment.

The second truth, which deals with the philosophy of complexity, emerged with the advent of the Descartes's thought of reason which known as the Cartesian mind, and developed with the development of cognitive sciences which study complex systems. The philosophy of complexity is based on the idea that complexity is part of any phenomenon of the materialistic and symbolic phenomena. It is not recommended, in this case to approach and study phenomena without thinking about its complex nature. The philosophy of complexity criticizes, from this point of view, the reductionist thinking which minimizes the nature of complexity, which is found in things, in the limits of major principles.

### Inter-disciplinary Processes between Sciences

The exchange of terms and concepts between different sciences didn't occur in an organized and controlled way, but it happened in a manner that shows the lack of separation between various branches of knowledge. This means that the diversity of meanings in one single concept which shows the aspects of assemblage and complexity (complex) in the scientific field according to Bourdieu [21]. The diversification of meanings is not more than an open pattern which enriches the accumulation and the construction of knowledge and allows the possibility of inter-disciplinary and overlapping processes between sciences. The inter-disciplinary process between sciences cannot be reached only through the migration of terms and concepts, but finds its explanation particularly in the reality of complexity that dominates material and symbolic systems. This process could not be approached by traditional sciences led by linear causality. From here, the philosophy of complexity appeared as a reaction to the reductionist thinking which dominated by the paradigm of simplicity (paradigm use in politics, because if you have to decide you have to simplify). The image of that, is that reduction leads to determinism, divesting, and generalization in sciences, and separates between the world of human, and the world of nature. We find this simplistic typology of thinking in

the works of Descartes who separates between the soul and the body and reduces man in saying: "I'm a thinking substance" [22].

Edgar Morin faces the simplistic thinking typology by a new paradigm, a paradigm of complexity and which based on understanding a part through the whole, and understanding a whole from the part, without separating between the part and the whole. This equation leads us to the Pascal's approach of the whole and the nonexistence and nihility. He puts it as follows:

After all, what is man in nature? Against infinity, everything against nothingness, in between nothing and everything... Nothing in relation to the infinite, all in relation to nothing, a mean between nothing and everything [23].

This new continuous scientific culture poses by Bachelard to Edgar Morin the problem of (Complexity and complication) how the same way that [24] and Albert Camus [25] had discussed this issue, in the context of talking about the human condition (the human condition), example for this idea that the man at the same time is a natural being (Natural and Surnatural) he is also at the same time a biological and cultural being. All of this makes him a complex and composite system. Anthropologist Marcel Mauss was interested [26] in highlighting this aspect of the complexity and structure of human by explaining of the close correlation between the biological human activities like (eating, drinking and defecation), the cultural values, standards, restrictions and the surrounding prevailing rituals. Series of ongoing interactions within the limits take place which are difficult to study carefully and unpredictable. Biological and humanitarian Phenomena show limitless number of interactions and complicity.

Complicity here cannot be predicted in whatever system, due to the presence of many simultaneous interactions within the system. This is the reality of social, human, animal, and mechanism systems which Wiener described (Wiener) on his posing Cybernetic science complex with the complexity of dynamic systems. Complicity we meant here is the one which had observed by Edward Lorenz [27] when he was doing a series of complex calculations in order to predict climate variations and he had discovered a chaotic behavior for a lineless system preventing an accurate calculation of weather predictions.

Variable interactions (interaction) which happen in the field of modern media and communication not differs much from what happens in other fields like air broadcasting for example, considering the two fields are dynamic systems stuffed with confusion and disturbance. The confusion in our field is the random and non-quantifiable behaviors which cannot be included due a modification occurs within the system, the new environment which today is called the new media is ready for confusion occurrence as it deemed a complex dynamic system has a number of limitless interactions and unstable and irregular behavior that remained difficult to dynamically control and predict its future condition [28].

The paradigm of complexity is; therefore, an invitation for a dialogue with the systems and the complex phenomena that allow the existence of anarchy, coincidence, and flaws within their patterns. This kind of dialogue doesn't support separation, separating the whole from the part and separating the part from the whole. From this perspective, we can consider the paradigm of complexity a new breakthrough in the field of sciences for it believes in the limitation of science and non-absolutism and the truth of unexpected phenomena and perturbation. As a result it made a rupture with mechanistic reductionism, and announced the end of science emptied from the perception of itself.

In the same context, and on another front, we find that cybernetic made also a rupture with the linear models of communication and with the certainty of knowledge, and made the relation of the cause with the result an assembled relation contrary to what it used to be in the past, because cybernetic discovered that the result goes back the cause to adjust it. Norbert Wiener [29] clarifies this mathematically in his interactive model which composed of the source of information, the sender, the channel, the receiver, the objective and the feedback. The science of cybernetic is a science based on the circular causality and on the phenomena of complexity in the animal, human, and mechanical systems. It was founded in the presence of interdisciplinary processes between various sciences: Mathematics, physics and natural sciences. Cybernetic as a science of self-organization which studies the levels of interaction between the elements of a system, forms its space from the contributions of researchers coming from different specializations. Among the most important of these contributions, we find the works of the French physicist and mathematician Andre- Marie Ampere, who discussed the art of leading society and its politicians [30] with the same meaning of the word "kubernetike" used by Platoon to mean the art of sailing ships.

## Conclusion

The media and communication sciences are; therefore the result of an accumulation of knowledge out of interdisciplinary processes between sciences. This accumulation appears in the theoretical construction of this multidisciplinary field. The theories of media and communication were developed through scientific currents, trends and approaches produced by different sciences. Among these important currents and trends we can cite the empirical functionalism trend represented by Lazarsfeld, Merton and Wright and the Structural approach represented by Jakobson, Barthes, De Saussure, Levis Strauss, and Austin; and the constructive approach led by Bateson, Watzlawick and Simon and other pragmatists.

These different scientific currents, trends and approaches meet to set up and form the theoretical and epistemological heritage of information and communication sciences. Despite the fact that these currents and approaches come from linguistic sciences, physics, mathematics, social sciences, and social psychology, these sciences themselves took shape and were formed within the confines of other sciences like philosophy and natural sciences. This what explains definitely, the presence of information and communication sciences in all fields of knowledge.

This wide presence of information and communication in all kinds of fields of knowledge, show the reality of complexity in the information and communication phenomena which means that the epistemological and theoretical construct for this field of knowledge is continuous and still forming and not ready to be limited in any time, as far as, the scientific efforts to invest in what is there in all kinds of sciences, in approaches and theses that serve information and communication, is in continuity as well. The theoretical and epistemological reality and status of information and communication sciences is at the end complex and assembled, and cannot be perceived and understood away from the reality of interdisciplinary processes or integration between sciences.

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