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ABSTRACT

This paper considers new technologies and their role in the production of knowledge. The main objective is to show that there is not a single angle from which to examine the issue. There must also be, as a starting point, the assumption that to deal with the new configuration of the world and the relations established by and under its mainstreams is to deal with the existence of human beings from an ontological point of view. In this sense, the paper argues for the imperative necessity of a philosophical approach in discussing the ways the contemporary world has brought knowledge to bear. (Author/MES)

The New Production of Knowledge: A return to philosophical principles

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Abstract: This paper presents some considerations on the subject of new technologies and its role in the new production of knowledge. The main objective is to show there is not a single angle to look upon the issue. There must also be, as a starting point, the assumption that to deal with the new configuration of the world and the relations established by and under its main streams, is to deal with the existence of human beings from an ontological point of view. In this sense, we argue for the imperative necessity of a philosophical approach in discussing the ways the contemporary world has brought to bear with knowledge.

Introduction

The discussion about knowledge is not a new one. As a matter of fact, knowledge and as consequence, the relation between subjects and the objects, is one of the oldest, if not the oldest question which hangs over mankind since ancestral time. Ancestral as it is, the look men have laid over nature, over the world and its mystery was the starting point for the reflection of what has been known as philosophy. But what is this that men have been doing and still do? What is philosophy? In order to develop my arguments in this paper, I would say that it is not possible to define properly what philosophy is, unless you live it. For example, you may give an accurate description of San Diego's streets, restaurants and so, by reading a good city map. You may even know the names of the streets around this place and give a good idea of its location within the city. On the other hand, someone like us, who are here, who have been walking on the streets, going to its restaurants, can give you more than a mere description. Someone who had been here can give you a *living* of what San Diego is, can fell it as an object full of life. No city maps, no photos can replace it, but the city itself. As had Professor Manual Morente (Morente, 1960) pointed out, philosophy is a *living experience of the object*, it is an exploration crossed by our *being-in-the-world*. The description gives you an idea, a representation, a concept, an intellectual elaboration while the *living* gives you an experience in the presence of the object.

If we agree, then, that information technology (IT) has pervaded all recess of our ordinary life, directly or indirectly, we could say that we have been living in technology. Technology has become not only an intellectual abstraction but also a lived experience It has become part of the *essence* of human beings in the turn of the century. Discussing IT is also discuss the *consistency* of men and, in this sense, it is an *ontological discussion*. On the other hand, it is necessary to say that this is not an easy task, "...We are always within the situation, and to throw light on it is a task that is never entirely completed. This is true also of the hermeneutic situation, i.e., the situation in which we find ourselves with regard to the tradition that we are trying to understand.(...) To exist historically means that knowledge of oneself can never be complete." (Gadamer, 1975, p.268-269). Gadamer sees in this essential historicity of our being the cause of our inability to achieve full explicit understanding of ourselves. Plato would argue with his *theory of ideas* to justify our imperfect comprehension. Whether attributing to our historicity or to the platonian *transcendence*, the search for the knowledge and comprehension of being is still a major challenge but we shall face it the best we can.

A question of method

The discussion on knowledge implies the discussion about the methods of science. Historically, the concept of science is related to the natural science and its procedures. In the search to achieve the status of

scientificity the human and social sciences have looked upon the methodology of its counterpart as the method *par excelence*. This positivism has impregnated the history of science and the behavior of human scientists as well. Substantial and innumerous discussions have been held on the topic but, more recently, some epistemologists have brought new approaches to the debate. The main core is the defense of a methodology of its own to the social and human sciences not necessarily mirrored on the procedures of natural sciences. On the other hand, natural scientists were / are seduced or challenged by the purpose of finding the common roots for their practices due to the influence of *phenomenology* or the *philosophy of existence*. Similar to what Husserl, on the thirties, had discussed about European science's crisis, not as a result of a question of method but as a result of the oblivion of a funding subjectivity first and undeniable, as pointed by Costa in a recent article (Costa, 1999).

Different schools have presented several conceptual hypothesis on the topic but in common is the difference of human science's object. This vein of reflection has brought a lot of debates to the philosophical arena of our time and yet has not come to a definite answer, if there is one. The specificity of our object of concern is due to the fact that "social reality has a specific meaning and relevance to human beings who live, act and think within it, who previously select, experience and interpret reality based on the common sense of their everyday life. The objects of thought that an expert in social science constructs to understand this social reality must be based on the thoughts that men share while living their quotidian life immerse in their social world."(Schutz, 1952, p.79-80, free translation). The social world, while an object to be known, is already given by a *pre-theoretical interpretation* and, therefore, restores the importance of our everyday life meanings.

Interpretation. When someone speaks of *interpretation* we usually associate with artistic or literary work. The ordinary reader of a poem, a romance, the musician, they are all interpreting a series of marks on a page. It does not cause any argument about this action. But how could we translate or transfer the interpretation of texts to the interpretation of our social life? *Phenomenology* has come to play a definite role to the relevance of the activity of interpretation as a method of knowledge. "One of the fundamental insights of phenomenology is that this activity of interpretation is not limited to such [readings of texts], but pervades our everyday life. In coming to an understanding of what it means to think, understand, and act, we need to recognize the role of interpretation."(Winograd & Flores, 1988, p.27). Far from discussing the existence of a meaning independent of the subject of interpretation, Gadamer takes the act of interpretation as an interaction between the text and the interpreter. For him, any individual trying to understand his / her world, is involved in activities of interpretation. The traditions or prejudices someone brings to the interpretation are nothing less than *pre-understanding* brought by our everyday life which occurs within a given cultural background. Becoming aware of some of our prejudices can emancipate ourselves from some of the limits they impose but the act of interpretation is individual, contextual, historical. As well as linguistic interpretation there are also non-linguistic experience, "it is therefore necessary to adopt a deeper approach in which interpretation is taken as relevant to *ontology* - to our understanding of what it means for something or someone to exist."(Winograd & Flores, 1988, p.30).

Along with the role of interpretation on developing a proper method to deal with social facts, the importance given to our *Lebenswelt* seems to indicate a shift from the *rationalistic orientation* towards an understanding of the world as a whole. Instead of accepting the dualism of two separate domains of the phenomena - objective and subjective worlds - philosophers, from Aristotle to Heidegger, have tried to integrate the primacy of experience and understanding without reflection. While Aristotle brought to the ground the intelligible world supported by our sensible experiences - Plato's dualism -, Heidegger stressed our existence in the world as the primary source to every interpretation and, at the end, to the production of knowledge. The assumption that detached theoretical point of view is superior to the involved practical viewpoint, current in natural sciences, is reversed by Heidegger. " Heidegger does not disregard this kind of thinking, but puts it into a context of cognition as *praxis* - as concernful acting in the world. He is concerned with our condition of *thrownness* - the condition of understanding in which our actions find some resonance or effectiveness in the world."(Winograd & Flores, 1988, p.33).

Interpretation as a method

The search for understanding is an act of the intellect as a result of a willingness to know. This most general principle is the same whether referring to objects from nature or from thoughts. As a matter of fact the results from the act of absorbing, of capturing an object comes to the production of what is known by knowledge, an *explanation* or a *comprehension* which implies an interpretation. Once again the duality from these different methodological positions gives origin to a profitable conceptual territory where concept of

knowledge is put at stand. Without going deep on the issues raised by this debate, we will try to come to a definition of knowledge first considering the structure of human life as a world of inter-subjectivity. In order to do so we must travel in time to rescue the early definition we will assume as the most accurate one.

Twenty centuries ago, one of the most startling revolution in the history of human thought was brought by the work of Parmenides from Elea, a small town in south Italy. He came to discover the rational *principle of identity* that states that something is or something is not. Another point raised by him and further developed by Plato, was the existence of two different worlds: the intelligible and the sensible. While the world full of aromas, tastes, colors in constant movement is just an appearance, the intelligible world is the world of logical and rational thought, the only guide to discover what reality is, what is outside from us. Our intellectual intuition is our reason, *being* and *thinking* come to be the same thing. This coincidence has flowed into the perception that the subject of thinking and thought also keep a close relation or, better saying, have an undeniable connectedness. But how does this reason operate? For Plato the reason operates creating *concepts* directed towards a portion of reality tied indissolubly into an unity. The unity is the essence of the object or its consistency. The intuition from the spirit confers on this consistent unity its existential reality through an idea brought by a subject. For Aristotle the coincidence among *Being* and thinking persists but he establishes the unequivocal distinction between the *ontological* and *logical* spheres, one deals with the discussion of Being and the other deals with logical discussion of its predicates. Different categories although fused. Aristotle's theology gives us a comprehensible world where to know is to form a concept about the individual object. "Conecer significa primero formar concepto, es decir, llegar a constituir en nuestra mente un conjunto de notas características para cada una de las essencias que se realizan en la substancia individual. Los processos de abstracción y de generalización que sobre el material de la percepción sensible ejercitamos nos conducen a la formacíon de un arsenal de conceptos. Saber es tener muchos conceptos."(Morente, 1960, p.111). To know is also apply the concepts we have created to the individual thing and also to cross different judgements throw rationalizations which get us to conclusions about the object. All these three instances come to be knowledge in general. While the discovery is essentially individual it must be shared through the *inter-subjectivity of existence*, through the traces of divine intelligence emanated from *Being* historically personified by the subjects.

It is also important to perceive that the process of producing knowledge is dynamic because based on *action*, based on the *relation* established among *beings*. Even when considering that for Aristotle the movement could not be properly addressed to the Being because it cannot be and not be at the same time, he was also moved by the comprehension of how reality and things come to be. According to Morente, Aristotle looked upon what reality offers as changeable and fluid. The intellectual intuition although logic is also permeated by the movements which characterize life, permeated by the essence of being in its continuous flow in search of the unknown. The subject of thinking would be first an existential subject and only afterwards, a logical subject. This premise is rather important to the point we argue in defense of different ways of producing knowledge not constrained to the rationalistic or logical sphere. If we analyze the epistemological contribution brought by the *theory of complexity* we could even argue that there seems to be a backward movement aiming to restore the first inception of philosophy: science of objects from the approach of totality and universality.

The *nuova scientia*

Notions as *uncertainty, chaos, complexity, self-organization, order/disorder* appear in the papers of different authors from several domains. From physics to biology, from biology to cybernetics, from sociology to astrophysics, from mathematics to communication, the debates promoted through the last twenty, thirty years indicates the emergence of new scientific theories in the search for the intelligibility of the universe as well as the ancient philosophical quest of knowledge. The crisis of the groundwork of knowledge that begun in philosophy during the XIX century has spread over the XX century helped by the confrontation with the new frontiers of science. The impeccable Order of the universe, assumed by natural sciences, has given space to an uncertain combination of order, disorder and organization. The crisis of scientific knowledge ground is thus tied to a crisis on the philosophical groundwork.

These new concepts point to the emergence of what is called *nuova scientia* which advocates the complexity of the process of knowing, of acquiring knowledge. The idea brings in its inception the necessity of an overall look on the process: to know is to act and react as a whole, one single action may affect the totality. The idea of *complexity* is not new, it has been object of concern of different philosophers like Husserl, Hegel and Heidegger, all of them related to phenomenological school. While dealing with objective facts from the real world, scientific theories are interested in finding and understanding what is behind the phenomena. The

delimitation of what is properly scientific is confronted with a certain zone obscure where *intuition* plays a central role. What were believed to be the exact portrait of reality became the results of social, politics and philosophical negotiations among the actors of the scientific arena. The consensus is legitimated by a community, which shares its own principles and background. There is no such a thing as complete objectivity; instead we must replace this concept by *inter-subjectivity*. On trying to identify this new trend, scientists are searching for the elements that would characterize the transformations in the mode of knowledge production such as*: context, boundaries, institutionalization of research, quality control, disciplinarity* and so forth. Summarily we will present its main features.

Characteristics of new mode of production

In the traditional mode of production, associated to the rationalistic tradition, the *context* is defined in relation to the cognitive and social norms that govern basic research or academic science (Gibbons et al., 1997). These norms are due to a certain body of disciplinary specialists who define what should be considered as good science in a specific field. In the new mode, knowledge is intended to be useful in a broader sense whether it be industry, government or society. Once knowledge is no longer bounded by certain limits, *transdisciplinarity* comes to play a major role bringing with it its own distinct theoretical structures, research methods and modes of practices, as pointed out by Gibbons (1997). Those specificities are dynamic. The discoveries can no longer be confined to any particular discipline or sites of production, instead, *new forms of organization* have emerged to accommodate the changing nature of the problems now addressed.

The *quality control* is no longer restricted to the judgment of those peers who had previously contributed to their discipline or to an institutional space. Quality control becomes more context-and use-dependent and takes more transient, temporary and fluid norms. It not only depends on the scientific authority of the practitioners from different realms, temporarily linked together to solve a problem, but also depends on the efficiency and usefulness of the solution of transdisciplinary problem. Quality is now "(...) determined by a wider set of criteria which reflects the broadening social composition of the review system. This implies that 'good science' is more difficult to determine. Since it is no longer limited strictly to the judgements of disciplinary peers, the fear is that control will be weaker and result in lower quality work. Although the quality control process [in this mode] is more broadly based, it does not follow that because a wider range of expertise is brought to bear on a problem that will necessarily be of lower quality. It is a more composite, multidimensional kind." (Gibbons, 1997, p.08).

Instead to value the individual creativity and the consensual figure of the scientific community, the new mode deals with *creativity* as a *group phenomenon* where individual contributions are part of a 'socially extended process'. "The loop from the context of application through transdisciplinarity, heterogeneity, organizational diversity is closed by new adaptive and contextual forms of quality control. The result is a more socially accountable and reflexive mode of science." (Gibbons, 1997, p. 09). Some of the originators for the emergence of this new mode of production are the dissemination or massification of education, the spread of specialists into government, industries, consultancies, but mainly, the development of information and communication technologies. The possibility of increasing interactions among scientists from different realms, brought by new technologies, has put knowledge out of institutional boundaries. New actors enter the scientific arena without being, necessarily engaged to the traditional sites of knowledge production.

Another feature identified by this research from Gibbons's, is the shift of emphasis, in many research fields, to problem solving, in the direction of problem-oriented research, instead of primary production of data and ideas - whether it be due to the expenses it involves as well as the ubiquitous research results brought by advanced information technologies. Reconfiguration of data and inputs to yield new results is the new emphasis.

The new mode, contrary to the older one, is characterized by a constant flow back and forth between the theoretical and the practical or applied. " Knowledge can no longer be regarded as discrete and coherent, its production defined by clear rules and governed by settled routines. Instead, it has become a mixture of theory and practice, abstraction and aggregation, ideas and data. The boundaries between the intellectual world and its environment have become blurred as hybrid science combines cognitive and non-cognitive elements in novel and creative ways. (...) Science no longer has a single strand, no shared method, no common preoccupations, no values which all its various branches share." (Gibbons, 1997, p.81-83).

As consequence knowledge has become "diffuse, opaque, [*sometimes*] incoherent, centrifugal". The distinctions between theory and practice, science and technology, knowledge and culture are blurred. The erosion of older ideas of knowledge is partly identified, at least, as result of the impact from technologies. The wide spread dissemination of higher education (in the industrialized countries -we shall emphasize), the ubiquitous of research methods and research results have diminished the frontiers between the traditional sites of

knowledge production and society. New disciplines were created by associating previously unconnected fragments of other disciplines, which have entered the curriculum in order to cope with different skills demanded by technology, "An overarching discipline like information technology stretches all the way from the most abstract concepts of artificial intelligence, which address fundamental ideas of mind and logic, to routine skills in the day-to-day use of computers. It has opened the way to a quantification revolution not only in the natural and applied sciences but in the human and social sciences as well." (Gibbons, 1997, p.83).

The transdisciplinarity has, as pointed before, its own characteristics. It is a continuous linking and relinking among concepts and configurations of knowledge which are tied together on a temporary basis in specific *contexts of application*. Knowledge produced under these conditions is characterized by a use or action since its inception and not left to a latter stage as in the traditional mode of production. This feature, a privileged one, of the new mode of production of knowledge certainly brings criticism even when transdisciplinarity is valued so highly. It does so because it challenges two of the main core of what is supposed to be quality on the traditional mode: consensus among a disciplinary community of practitioners and its credited institutional space (universities, national academies, professional societies). The transient and temporary context where the new mode of knowledge production takes place threatens this assumption. According to the disciplinary mode of production, knowledge brought by science should not be constrained by the market or specific context of application. But the fact is that transdisciplinarity, beyond the fact that it is problem solve directed, is also guided by a certain number of basic conditions as well as the disciplinary mode. The social constraints, the efficiency or usefulness of transdisciplinary solution are bounded together since the identification of the problem. In this sense we might say that transdisciplinary knowledge is even more reflexive and conscious than the strictly scientific, disciplinary one from the other perspective or mode.

Another feature of this trend is related to the dissemination of knowledge production. In the same way that traditional sites of knowledge production are threatened by the diffusion of scientific capabilities throughout different sectors of society, so is the dissemination of knowledge producers. Different and important kinds of knowledge are being produced not only by scientists and technologists but also by symbolic analysts, communication specialists, educators and so. Those who work with symbols, concepts, theories produced by others in different sites reconfigure them into new combinations. Instead of knowledge-based industries we now witness the emergence of *knowledge industries* where knowledge itself is the commodity that is traded. In these industries the value is added by the continuous reconfiguration of its commodity in order to solve a problem or to meet a need.

An analogy between technology and philosophy

It is not difficult to perceive that this complex whole does have impacts not only on the epistemological ground but also on the social and political spheres related to scientific production of knowledge. As we have pointed before frontiers have been broken as consequence of different features such as massification of education, free flow of communication and the spread of knowledge across different sectors of society. Information and communication technologies do play a major role in this paradigm shift. Most unlikely would we witness such revolution without an increase in the density of communication, without the basic technological infrastructure to support such activity worldwide. The infrastructure not only speeded up the process but also created more linkages, different decentered nodes across a world web. It is no coincidence the bursting of another transdisciplinary research area such as the *cyberspace*.

One of the main feature language has brought to us is the figure of analogy. It is, along with metaphor, a rich resource to explain ideas, to build concepts, in sum to produce knowledge. Intending to keep on this track already explored by different and important authors, I will try to connect the arguments presented above by establishing a parallel among some philosophical concepts and the idea of cyberspace as presented by Pierre Lévy. Before that I shall justify my choice for cyberspace by arguing that it represents the convergence of what is usually labeled as IT. Far from being just another tool aimed for different purposes, the cyberspace integrates different communication and information technologies in an environment. By environment I mean a whole where different features are perfectly integrated but keeping its own characteristics.

The cyberspace is presented by Lévy as one of the most startling technological revolution we ever witnessed. This digital technology has become a new space for human interaction, human socialization and also a new arena for the production of knowledge. Among several characteristics, the author points to its philosophical dimension of a space of *potency* applied in the sense of virtuality, of something that can potentially

come-into-being. This virtual environment is not geographically restricted and is not submitted to the linear flux of time. Another relevant aspect is related to its potentiality as a space of interactivity not restricted to exchange of data and information but also exchange of sounds, images and simulations in a multimedia sense. The web is dynamic in its essence, the flows of changes are spread all around without a hierarchical center, it is only submitted to the pace of individual discoveries and at the same time opened to accommodate and welcome creativity. The emergence of this space of rich potentialities, at the same time virtual and real, has become an instance of our existence whether to deny its importance or to explore its openness.

Far from being apologetics about its potentiality we look at it from the perspective given by analogy. If we recall some of the characteristics of new mode of production presented before and establishes some linkages among them and the philosophical discussion about knowledge, we may infer that the dynamics of the new mode of production emphasizes not only the action of the subject in dealing with reality but also the importance of flow between intellectual work and the human practices. This idea of integration or conectedness between logical and existential spheres direct us toward comprehension and interpretation. We identify among these concerns close links to Heidegger's *phenomenology* and *cyberspace* potentialities. Heidegger argues that the separation of *subject* and *object* denies the most fundamental question of *being-in-the-world (Dasein)*. We have been thrown in the world where we live, we act and also think. There is no such a thing as properties inherent to the world; these properties do arise in the act of living, in the relation established among the subject and the concrete reality of its existence. This pre-theoretical living (*present-at-hand*) comes to the status of knowledge itself when there is some kind of breaking down (*unreadiness-to-hand*), when as a result of some 'concernful action' we become aware of the existence of objects and their properties.

The whole idea of thrownness gives us the dimension of deep subject immersion, an immersion which project us far from just a logical comprehension of reality. It challenges us to perceive ourselves as part and producer of the same reality we aim to apprehend. It confront us by restoring our own status of nature.

Conclusions

From philosophy to science, from nature to men, from technology back to philosophy...

The idea of moving within a wide web of concepts brought by our living experiences which produces knowledge, may signalize a certain return to what had been the ancient concept of philosophy: an aspiration to understand the whole, a love to wisdom and most of all a living experience.

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