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TÍTULO: La Inmanencia de la Información y el Trabajo.

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RESUMEN: El objetivo de este artículo es definir información en una forma que permite su descubrimiento como elemento en cualquier proceso de trabajo, enfatizando su naturaleza material, permitiendo la extrapolación y el uso del concepto de información como una entidad física/material con atributos correspondientes al de cualquier otro objeto físico/material, llevando al descubrimiento que el contenido informacional es inmanente al esfuerzo de trabajo humano como valores de uso concretos y como trabajo abstracto; perspectiva que permite una diferenciación fundamental entre la era industrial y la era de la información, resultado que permite la exploración del impacto que dicho enfoque proporciona en la explotación del trabajo antes y después de la era de la información, ilustrada con varios ejemplos.

PALABRAS CLAVES: Información, trabajo, materialidad del trabajo, era industrial, era de la información.

TITLE: The Immanence of Information and Labor.

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ABSTRACT: The objective of this article is to define information so as to allow its discovery as an element in any labor process, emphasizing its material nature and permitting the extrapolation and use of the concept of information as a physical/material entity, with corresponding attributes as any other physical/material object, leading to the discovery that information content is immanent in the exertion of human labor in the form of concrete use values and abstract labor; perspective which allows a fundamental differentiation between the industrial age and the information age. A result that allows exploration of the impact that such an approach provides in the exploitation of labor before and after the information age, illustrated using several examples.

KEY WORDS: Information, labor, materiality of labor, industrial age, information age.

INTRODUCTION.

20th century capitalism evolved from the industrial age to the information age, where "… the core of the transformation we are experiencing in the current revolution refers to technologies of information processing and communication" (Castells, 2010, p. 30). What was true of the industrial age was the production of manufactured goods and services, while the information age is identified as such due to the incorporation of technologies of information processing and communication as important elements, if not the major elements, in the production process. Information may even be considered an additional factor of production alongside land, labor and capital (Kendall & Scott, 1990). Information is not only an input to production of goods and

services, but an output that can become an input, in an ever-evolving and growing pattern of production.

The information age has led to the proliferation of all things digital, which includes hardware and software components. Hardware and software that have become ubiquitous in our daily lives. Digital television, portable computers and digital tablets complement the associated Apps to access the Internet: email, Twitter, Facebook, Dropbox, YouTube and Pandora. Becoming indispensable, everyday use consumer articles. All supported by an infrastructure required to sustain its production and its consumption. From the mining and processing of raw materials, to the manufacture of products, to the needed fundamental research that supports the industrial scale production and assembly of components. The worldwide distribution and marketing required to make digital products necessary items for daily living.

In this digital world, information plays a central role in implementing technologies of information processing and communication. Fundamentally, this requires knowing what information is. What is hardly ever mentioned is that information, the raw material for using technologies of information processing and communication, is not as transparent a concept as it is made out to be. There is no consensus on what information is (Capurro & Hjørland, 2003; Floridi, 2010; Hofkirchner, 2008, 2013a, 2013b). This lack of consensus is the Achilles heel of interpreting the functioning of the information age.

This paper begins with an exploration of a fundamental definition of information that seeks to ascertain its general applicability in the process of production. Leading to discovering the relation of information to labor, that reveals that fundamentally information is material. In delving into the implications of this perspective, we find that the essence of dealing with the body, the brain and digital machines is the same, i.e., their workings are both material in nature. This is also the context that labor falls under. But implicit to the process of congealing labor on raw materials,

instruments of labor and/or products of labor is information. This is as true today as it was true in the earliest of times. What is more noticeable today is that information has taken a more independent role as the raw material and product of technologies of information processing and communication that is reused in an endless process. Nowadays, more than before, it is not difficult to postulate the immanence of information and labor; therefore, if labor is to be explained in all of its dimensions, information has to be conceptually explained to take full advantage of any applicable derived implications.

In short, the goal is to establish a material basis for all things digital, and further and more importantly, to examine the larger implications and ramifications of labor as indelibly tied to information.

DEVELOPMENT.

Definition of Information.

A definition of information that may be viewed as fundamental is that by Bateson stating, “In fact what we mean by information – the elementary unit of information – is a difference which makes a difference...” (Bateson, 1972, p. 321). The simplicity and generality of this definition implies qualitative and quantitative characteristics.

An important qualitative characteristic of this definition of information is its self-referential, subjective nature emphasizing the self as the center in ascertaining “differences that make a difference”. It suffices to say that human beings engage in an interactive dialectical process with their environment in gathering information by way of our senses to act on the environment, to allow satisfaction of physiological needs. An example of one such physiological need is the need to breathe, a physiological need that denotes consciously or unconsciously a subjective, self-referential “difference that makes a difference”.

An important quantitative characteristic of this definition of information is revealed when we realize that human beings are shaped by material occurrences in the environment – real things and processes – that result from sensory experiences, as well as by their actions in the environment and the effects of those actions. When we identify differences what we are really doing is recognizing that our natural world is dynamic. To recognize a difference requires two instances of sensory data, i.e., two sensory maps that are spatially and/or temporally separated, which are compared. The comparison results in differences that acquires physicality in our brain as adaptable and changing neural networks, leading to further processing and associations that are pertinent to the satisfaction of physiological needs and related learning. More importantly, our sensory organs transform these sensory perceptions into electrochemical signals that travel through our nervous system to our brain. There is no distinction between signals emanating from touch, auditory, olfactory, gustatory or visual sensory organs as they travel to the brain. But what the brain processes are the detected differences in incoming signals, i.e., information. This processing of information is done for the purpose of satisfaction of physiological needs. The related learning is not a contemplative act, but rather it leads to developing human capabilities that allow successful dialectical interaction with the environment. The physical/material representation of information in the neural networks of our brain allow this cumulative process to develop during our lifetimes. The resulting learning process in our brain shapes how historically we are able to deal with our environment, not only as individuals but socially.

Another notion advanced by Bateson was that ideas and information are synonymous (Bateson, 1972, p. 318). So, difference, information and idea are one and the same notion. Cognitively by way of our senses, we are able to deal with differences and characterize these differences as ideas that allow us to discern, categorize, describe and share what we learn about our world, orally and otherwise. Ideas that can be gesturally and/or orally expressed or, after writing was invented,

sharing ideas by extending our memory into the world using pictographs, sculptures, language and/or writing. In short, the differences/information/ideas that take hold or acquire a material representation in the neural circuits of our brain, reflecting the material nature of our world. They then find themselves reflected back into our world in multifarious physical forms and actions.

A physicist restates this as "information is physical" (Landauer, 1991, p. 23). Indeed, "Information is not a disembodied abstract entity; it is always tied to a physical representation. It is represented by engraving on a stone tablet, a spin, a charge, a hole in a punched card, a mark on paper, or some other equivalent. This ties the handling of information to all the possibilities and restrictions of our real physical word, its laws of physics and its storehouse of available parts…" (Landauer, 1996, p. 188). The salient aspect of these characterizations of material/physical information is that all are caused by human action. In the brain, information takes the form of preferred pathways where behavior and ideation are explained as due to synaptic changes in organization as a result of conditioning, brought about by our sensory and activity experiences, impacting neural network dynamics (Hebb, 1949). The human brain becomes an ever-evolving human organ that reflects the physical world in its organization, but at the same time has the capacity to affect the organization of the world by the actions of the human being in the environment, particularly in the act of labor to eke out an existence in and from nature, in efforts to satisfy physiological needs.

In summary, one advantage of this definition of information is its generality, and therefore, its applicability to every type of situation in which a human being generates and interacts with information. Also, it allows extrapolation and use of the concept of information as a physical/material entity, with corresponding attributes as any other physical/material entity, with which we are familiar and feel comfortable manipulating and using.

Useful and Abstract Labor.

Engels emphasizes the fundamental role of labor in human existence (Marx & Engels, 1987, p. 452), “LABOR is the source of all wealth, the economists assert. It is this next to nature, which supplies it with the material that it converts into wealth. But it is also infinitely more than this. It is the primary basic condition for all human existence, and this to such an extent that, in a sense, we have to say that labor created man himself”.

Marx elaborated on this by stating (Marx, Mandel, & Fowkes, 1976, p. 47), “Labor, then, as the creator of use-values, as useful labor, is a condition of human existence which is independent of all forms of society; it is an eternal natural necessity which mediates the metabolism between man and nature, and therefore human life itself. Use-values like coats, linen, etc., in short, the physical bodies of commodities, are combinations of two elements, the material provided by nature, and labor”.

Further (Marx et al., 1976, p. 55), “The mystical character of the commodity does not therefore arise from its use-value. Just as little does it proceed from the nature of the determinants of value. For in the first place, however varied the useful kinds of labor, or productive activities, it is a physiological fact that they are functions of the human organism, and that each such function, whatever may be its nature or its form, is essentially the expenditure of human brain, nerves, muscles and sense organs. Secondly, with regard to the foundation of the quantitative determination of value, namely the duration of that expenditure or the quantity of labor, this is quite palpably different from its quality. In all situations, the labor-time it costs to produce the means of subsistence must necessarily concern mankind, although not to the same degree at different stages of development. And finally, as soon as men start to work for each other in any way, their labor also assumes a social form.”

These statements summarize the fundamental aspects of the relationship between human beings and nature. Indeed, the immanent dialectical relationship between human beings and nature is the basis for our social and historical development. This also brings into focus that "... the expenditure of human brain, nerves, muscles and sense organs…" in interacting with nature brings about the creation of qualitative use values and quantitative values as fruits of our labor. The process of labor necessarily implies that humans are not only able to exert their labor power but also process information as living beings, i.e., detect "differences that make a difference." In the dialectical process of doing labor and changing raw materials, instruments of labor or products of labor by creating use values and values, specific to the creator and to her product of creation, they are not only recognizing but imparting information, "differences that make a difference" into their products of labor.

There is a parallel alignment of qualitative and quantitative characteristics of information and labor. Concrete qualitative useful labor produces use values subject to individual needs that arise from subjective, self-referenced information. For example, if a spoon is recognized as a tool that makes the act of ladling hot soup into our mouth more efficient than using our hand, we value the spoon for its use value. It would not be of concern whether the spoon is made of wood or a fine metal, just so long as it serves the intended use and satisfies the use value for which it was made. The concrete information content of each spoon would be considered to be the same, both serve the role of ladling soup into our mouth. Concrete information content is also viewed as a "difference that makes a difference" for the purpose of ladling soup when comparing using your hand as opposed to using a spoon, since a useful tool has been developed.

The existence, side by side, of a wooden spoon and a fine metal spoon reveals that there is also another "difference that makes a difference" that needs to be explored. This other information is revelatory that the abstract labor-time required to make the fine metal spoon is greater than that

required to make the wooden spoon. The congealed labor-time is shown to yield different intrinsic qualities to the spoons, e.g., dull and shiny spoon surfaces, respectively, for one.

In short, there is an immanent and indissoluble relationship between information and labor. Concrete useful labor yields information relevant to use value. Abstract labor-time yields information relevant to value. Information impacts the labor process qualitative and quantitatively, and vice versa.

Information, Labor and Communication.

The immanent relationship between information and labor is as old as humankind, and reflects the indissoluble quality of this relationship and also of the organism-environment system. One of the results of this relationship in human social groups is the origination of human speech. Orality in humans even today is present around the world and reveals the highly-developed skills that can be harnessed in its pursuit, and how it can be used as a storehouse of labor related cultural traditions that can be passed down from generation to generation resulting from the labor expended to eke out an existence. Each generation adding its own experiences as it honors what came before them. Another expression of this immanent relationship are wall paintings, ancient stone artefacts, sculptures and musical instruments. The labor needed to fully realize the potential of all of these cultural expressions is inextricably linked to information.

The ultimate tool that brings this to the fore takes the form of writing implements. This momentous event is significant because it ties together for the first-time, tools that allow a more permanent communicative existence to differences/information/ideas that are the result of labor directed to the needs of each individual writer. It begins with the practical need for more permanent accounting practices in Mesopotamia in the fourth millennium BC with cuneiform writing, and evolves, from simple pictographs toward more structured signs representing word

sounds. The significance of writing is that it provides a more permanent expression of differences/information/ideas. This is achieved by putting a tool between the originator of the differences/information/ideas or writer and the medium of expression on which that writing implement is used. The writing implement serves as an extension of the writer to directly mold nature to the will of the human yielding this tool.

The separation of the writer from the medium of impression and expression has the potential to dispossess the writer from his labor, i.e., from his creation of an original, depending on the nature of the medium of expression, but the writing process uniquely characterizes the expression of the talent of the writer. That is the tie between the writer and his work that is difficult to erase, and represents the use value of writing with unique personal characteristics. In most instances, the medium that is used for writing is capable of being destroyed, meaning the possible end of the differences/information/ideas. It is also possible that the medium lasts longer than the lifetime of its originator. Then, the sharing of the written differences/information/ideas is still a possibility, only if the code associated with the writing is shared over time. In short, the invention of writing was a qualitative leap for humankind in promoting the permanence of differences/information/ideas. Classical writings could be accumulated, critiqued and enhanced over many generations and contemporary cultures.

The next step in the communication of differences/information/ideas is the printing press where an original is proffered to the printer for reproduction. This allows the proliferation of originals due to lower cost of production, but further disowns the writer of the original. But in a few cases, it might even allow the printer to pay the writer for his efforts and make a profit from the printing run. The printing press makes the final product one of many copies with no sign of the writer or the printer, if not contained somewhere in the text, such as in newspapers. A limitation of print media is its quasi-permanence that limits the manipulation of its content.

The discovery of electromagnetism and the electromagnetic spectrum brought about the next technological developments that allowed by analogic means the reproduction of the human voice and its transmission through the airwaves. So, once again, it was possible for oral expression to take prominence from originals that were either generated in real-time or read from written texts, and even recorded in analogue media for repeated consumption, but limited in the use and/or manipulation of the recorded information. It is only with the advent of the need to improve the efficiency, precision and reach of oral and written communication that the technologies of information processing and communication gained impetus resulting in the digital revolution of which we are now a part, and which feeds the information age. These events led to the ultimate transformation of differences/information/ideas into binary digits or bits that are capable of being processed in electronic digital machines. Thus, enabling the storage, processing and transformation of differences/information/ideas from the head of its creators to machines. Digital machines that have become our companions in their various embodiments.

Illustrative Examples in the Information Age.

What is said to be distinctive of the industrial age are the many quality products that can be produced in large volumes, reducing the cost of production, where the technologies of information processing and communication content in these products is negligible. Typical examples are books and music recordings. It may be said that in the production of these goods live labor is transformed into dead labor, i.e., labor that is fully congealed into these products.

Dead labor is inseparable from the products of labor. It is congealed in the products of labor and cannot be recovered. This is true of books and recordings. The possibility of reuse is near to impossible. From the above description related to the immanence of information and labor, it is not possible to conclude that information is not a factor that is relevant to their production, but we

may conclude that technologies of information processing and communication are not relevant to their production. Also, what these products have in common is that they share similar labor and information characteristics as the example of the spoon, i.e., they all have use value and value, and associated informational content.

Corresponding products of the information age may be said to incorporate greater amounts of technologies of information processing and communication in the production process of digital books and recordings. Not only we are able to save digital information, using technologies of information processing and communication, in digital books and recordings, but to download them and take advantage of the content by using complementary technologies in the form of cell phones or digital tablets. Similar to their industrial era counterparts, they have informational content of a similar nature.

These products of the information age are also different in a more fundamental way. These digital products not only produce surplus value that accrues to the capitalist in the form of dead labor, akin to that of industrial era products, but the digital content in these products is owned by the capitalist and may be likened to virtual living labor. The capture of digital content is akin to capturing the artist/laborer in digitized from, artist/laborer which has lost control of her creative product which can be brought back to life at will by the capitalist. This is true of internet interactions (Google, Facebook, YouTube, Twitter, etc.) as well as other products such as designs, books, compositions, movies, etc. So not only does the capitalist benefit from surplus labor, but the capitalist is able to accumulate virtual living labor as part of her stock of capital. The result is greater exploitation of the labor force, not only during the duration of the labor process, but over a longer time horizon dictated by the capitalist. In this scheme, alienation acquires a new meaning since the laborer does not even realize that his labor continues to exist for the capitalist.

This same perspective may be taken with regard to robotic creations where once built and programmed by human beings a robot can repeat its operations as many times as needed to perform repetitive labor operations that no human worker could match. The benefits to the capitalist are reduction in the number of workers needed to perform the work of many more human workers. The growing pool of the unemployed appears inevitable, where laborers have no recourse to the labor market. They are collateral damage to the accumulation of virtual living labor by the capitalist.

CONCLUSIONS.

Bateson's "difference that makes a difference" allows us to connect physical/material information to the labor process, and to discover that information content is immanent in the exertion of human labor, and vice versa. Use values reflective of concrete labor and labor-time reflective of abstract labor have information related counterparts. Given this background, the fundamental differentiation between the industrial age and the information age, is not only the differences in informational content but rather the use of technologies of information processing and communication to process digital information.

The impact on the exploitation of labor that signals a significant difference between these two periods is that the exploitation of labor acquires an added characteristic related to the capturing of virtual live surplus labor by the capitalist, increasing the level of exploitation, alienation and resulting in growing pool of unemployed labor.

Engaging in the labor process has led us to transform our environment in our own image and likeness with the goal of satisfaction of our physiological needs. Even, in the present circumstance that we live, all of our activities of higher and lower technological development are with this purpose. Over time the process of engagement with our environment and with each other has led

to a process of congealing ourselves into the material objects with which we interact, in a process fraught with alienated labor, in the effort to fully reproduce ourselves in our own creations.

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