

INFOGRAMIC ANALYSIS: THEORETICAL APPROXIMATIONS TOWARDS AN ANALYTICAL MODEL OF LEARNING IN ICT EDUCATIONAL SETTINGS

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Abstract

Based on a Lefebvrian view of spatiality, the paper endeavors to offer a spatial understanding of how information and knowledge are digitally reconstructed by ICT systems. It proposes an analytical model of theoretical approximations of learning in ICT learning environments, termed *Infogramic Analysis*. This model, aims to identify patterns of power, domination and struggle within digital information channels of human/ICTs communication and interaction, and to advance our understanding of how learning occurs in digital communication and of how ICTs organize our representations and realities of the world within and around us, and consequently necessitate and direct decisions of social action.

Now that we have all this useful information,
it would be nice to do something with it.
(From a Unix Programmer's Manual)

The contemporary worldwide information society finds itself in a global crisis of identity. The problem is information related. With the advances in applications of digital and information communication technologies, the pace of human learning has rapidly accelerated. The world has come to find out about each other too much too fast, too soon. Learning environments and educational settings at a worldwide scale find it increasingly difficult to cope with the effective application of new information communication technologies, the exploitation of information and transfer of knowledge, or to come to terms with the realization and appreciation of emerging conditions of learning with ICTs.

Post-modern ICT Learning Environments

A new meta-post-modern logic upsets learning processes and ICT learning settings and guides digital and information communication technologies in their production of new forms of knowledge and diverse cultural configurations by changing the conditions of production of knowledge in the global socio-economic structure. ICT learning environments and educational settings emerge as diverse post-modern formations characterized by the intensification of the availability and use of information. By means of electronic communication and digital applications

and technologies, they reproduce and sustain a diverse worldwide digital culture characterized by technologically dissimilar and informationally complex learning experiences. ICT learning environments and educational settings are mutated structural configurations of a culture — which I term *postmodernity-and-beyond* — emerging out of the global information explosion and defines the societies of digital capitalism and secures the conditions for the flow of information by reproducing itself through digital regenerations in hyperspace.

A global and differentiated system of information has always been responsible for the social organization of societies worldwide. The intensification of the use of information through ICTs points to the importance of the organizational power of the system of information as it becomes critical in the reconstruction and retransformation of the global social order and social change. In a world dominated by the presence and use of digital and information communication technologies and by an increasing human consciousness being integrated with such technologies, I contend that an analytical model of learning in ICT learning environments can be synthesized and developed from a detailed analysis and spatial theorization of the structure and organization of the system of information.

Hypotheses

Such an in-depth analysis and a ‘framing’ of the organization of the system of information can proceed along four inter-related hypotheses (Andoniou, 2008) investigating: the historical and socio-cultural conditions of the world society (the *Information Flow hypothesis*); the specific informational patterns of organization in social structures, ideological discourses and cultural trends (the *Social Knowledge hypothesis*); and, the diverse systemic properties, interdisciplinary analogies and isomorphies of the system of information (the *Code of Information hypothesis*). Based on assumptions made in the first two hypotheses and expanding on the assumptions of the third, a fourth hypothesis can then be formulated (the *System of Information hypothesis*), which offers a novel philosophical proposal of the structure and organization of the system of information. This comprises a series of theoretical approximations, more speculative and futures-oriented, regarding the organization and implication of the system of information in the era of global electronic communication and information communication technologies. Brief statements of the *Code of Information* and of the *System of Information* hypotheses are cited next, which will offer a better understanding of the proposed theoretical approximations throughout the paper.

The Code of Information Hypothesis

The system of information in the age of digital and information communication technologies can be identified to have distinctive systemic characteristics, the organization and structure of which can be analyzed through the code of information. The *Code of Information hypothesis* refers to general patterns of organization of the system of information, and with regard both to content and relationships. In particular, the code can incorporate the nature and character of information, processes of association and interaction, the source, the destination point and the channels of the communication of the system of information, and so on. The code of information dominates the emerging new *postmodern-and-beyond* social configurations and cultural environments intensifying hyper-real experience along new relations between spatiality and time. Moreover, the digitalization of the system of information makes it vulnerable to control and programmability, consequently affecting the construction of social knowledge, 'reality' and the world itself, all of which organizational context is dependent on the code of the system of information.

The System of Information Hypothesis

The system of information spans along multiple coexisting spatial levels of organization across the arrow of time, which represent conditions of freedom, of exploitation and of domination of the system of information, respectively. In the contemporary era of digital and information communication technologies, of hyper-real landscapes and fantasy worlds, the fractalization of the system of information establishes new relations of meanings and understandings.

Information communication technologies are digitally constructing reality, or to put it in another way, they are *digitally reconstructing hyper-reality*. At any point in the arrow of time, the system of information presents coexisting and alternating degrees of authentic, simulated and illusionary segments of information. The meaning of their particular logic of organization is dependent and is reflected in the organization of social life and the world. In the era of digital and information communication technologies, the system of information *virtually implodes* towards fractalization. The meaning that justifies the relation of the system of information to the social configurations and entities which reflexively are organized by it is undergoing a gradual transformation of deconstruction, differentiation and reconstruction. Consequently, all logical justifications and confirmations of social reality in the *postmodern-and-beyond* world, are destroyed, intensified, transformed, reborn and set free of the tyranny of reason.

Trialectics, Heterotopias and Thirdspace

The suggested hypotheses leading to the argument for *the digital reconstruction of hyper-reality* and, later, to the proposed theoretical approximations of the *Infogramic Analysis* model, challenge conventional modes of spatial thinking and require a conceptual shift. This is provided by the alternative envisionings of spatiality, as illustrated in Lefebvre's (1991) "trialectics," Foucault's (1986) "heterotopologies," and Soja's (1996) "thirdspace," which are briefly mentioned here.

Following Lefebvre's (1991) view of human spatiality the philosophical considerations, in the current paper, envision the system of information as 'real' and imagined, physically present but absent or invisible in an abstract way. Lefebvre's dialectically linked triad (spatial practice – representations of space – spaces of representation) defines the perceived spatiality of the system of information in the proposed model of *Infogramic Analysis*, a conceived space of representations constituted via control over and exploitation of knowledge, signs, and codes, and the lived informational space of complex and imaginary symbolisms, coded and not.

Foucault (1986) defined "heterotopias" as those real and singular spaces to be found in specific social environments and whose functions are different or even the opposite of others. Assumptions, analogies and isomorphies from diverse analyses which support the hypotheses stated in the current argument, suggest that the system of information can be considered as a "heterotopia." As such, it is characterized by principles of "heterotopology" and it is identified in worldwide signification and representational systems in differentiated forms; it can alter and transform over time in synchronization to specific environments it occupies; it can exist in different spatial configurations, even incompatible to each other; it presents heterochronic formations; it can be closed and isolated or open and permeable at the same time; it is responsible for creating illusionary 'other' spaces.

Soja's (1996) "thirdspace" epistemology opens up the possibilities of looking at the same subject in different ways, as sequence of never-ending variations on recurrent spatial themes. Applying this "trialectical" thinking to the system of information provides the spatial perspective and theoretical basis needed to consider and understand social reality and change and the emerging hyper-reality in the Digital era. This can be realized through flexible and dynamic open-ended theorizations, based on frequent reconsiderations and recombinations of alternating conceptualizations of the structure, organization, and communication

of the system of information such as the model of *Infogramic Analysis* proposed in this paper.

The Digital Reorganization of Information

Following the theoretical assumptions in the four hypotheses and the philosophical positions underlying them, I argue that a pattern of structural and organizational characteristics of the system of information can be indicated which provides the background to develop an argument for *the digital reorganization of information* in hyper-spatial environments.

The system of information is shared in a variety of ways within networks of exchanges, where internal and external communication enables its content to organize and be organized. The system of information is a complex system with substantial internal differential integration and co-ordination that exists in a state that is neither totally ordered nor totally chaotic. Alternating between order and chaos it settles into patterns associated to 'relations of meaning'. Although the distribution of the elements of information patterns is unpredictable, still they do not disperse outside the boundaries of the pattern. Breaking apart the elements, that make up the code of information, and looking at the individual pieces and their interrelationships is the key in understanding the complexity of the system of information, and coming to a closer understanding of the relationship between 'reality' and 'hyper-reality'.

A dynamic retransformation of the system of information in digital and ICT systems takes place, characterized by self-similarity and fractal dimensionality. This *digital reorganization or fractalization* of the system of information, I contend, can be described along distinct phase spaces (spatial changes across time) of fractal implosion empowered by equally distinct interconnecting micro-processes, which comprise the archetypal organizational pattern and force of change and transformation responsible for the unpredictable vulnerability and programmability of 'real' and 'hyper-real' social configurations in the Digital era. These processes are discussed in brief next along with some additional elements of the generic macro- and micro-structure of the system of information.

Infogramic Analysis

At a time when digital and information communication technologies dominate the world cultural experience, the *digital reorganization of information* and of social knowledge opens variable and infinite learning possibilities for the future global society. The reconstruction of the digital justification of 'reality' or *the digital reconstruction of hyper-reality* stresses the need to understand the code of the

organization of the system of information within fresh ways of thinking, unavoidably abstract and probabilistic and possibly paradoxical and controversial. To this end, I propose a series of theoretical approximations on the organization of the system of information, namely: the *Infotype*, the *Level-States of Information*, *Virtual Implosion*, *Fractal Dynamics*, and *Infogramics*. These comprise the analytical model which I term *Infogramic Analysis*.

These theoretical approximations can be argued to be a meta-philosophical proposition towards a radical reconstruction of long-established thinking of the production of social knowledge. The analytical model put forward in the form of conceptual/digital/graphical approximations is a radical methodological suggestion on how we can improve our understanding about the operation and impact of the system of information in the digital reconstruction of contemporary societies and on the re-realization of human consciousness in the postmodern-and-beyond era. The proposed theoretical model aims to offer an alternative idea and to envisage as to how we can use the results of such an understanding to identify patterns of exploitation, domination and struggle in a diversity of real, imagined and other places. The model hopes to redefine principles of organization of social transformation, social change and successful survival in living and learning with information communication technologies.

The spatial context within which the proposed theoretical conceptualizations are made explicit and can be represented with more ease is where human and machine technologies converge, that is *hyperspace* or, *cyberspace*, or what Wilson and Corey (2000) defined as *e-space*, the spatial context of the emerging digital and information communication technologies, such as, computers, telecommunications networks, electronic media, and the Internet.

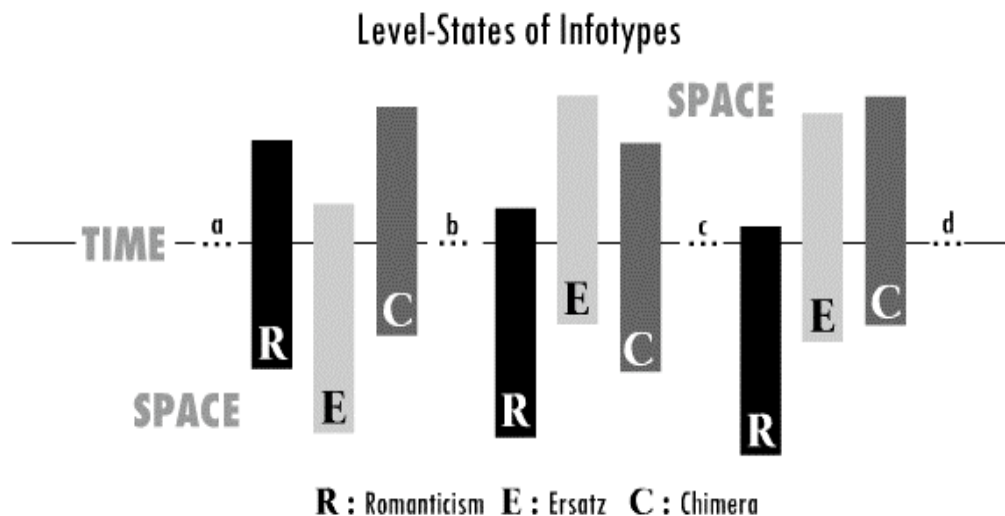
Infotype

At any moment of transformation across time, the system of information can preserve its quantitative and qualitative dimensions from one trajectory to another, which are embodied in what can be called an *infotype*. An *infotype* refers to the specific content and the general architectural characteristics of the system of information. Different systems of information may belong to the same infotype, and a system of information may belong to more than one infotypes. The infotype carries the code (instructions) which the components of the system of information need to use for their structural and interactive orientation and their iterative proliferation. For an infotype to survive and secure its existence in the ocean of informational landscapes, it needs to regenerate constant change by way of adaptation and habituation to the available informational environments. Adaptation implies quantitative and/or qualitative alterations, which can be the result of mutation of information through iterative processes, whereas habituation refers to the successful establishment of adaptation.

Level-States of Information

Infotypes are organized across space and time in an inter-connected triad of associated spatial level-states of organization: an *Era of Romanticism* (actuality), an *Epoch of Ersatz* (imitation) and an *Age of Chimera* (fantasy). *Romanticism*, *Ersatz* and *Chimera* are space-time coordinates, which remain unaffected as a triad globally, but they differentiate individually and locally, across the arrow of time. They refer to the volume and intensity of available information during various historical periods, not necessarily distinct ones, but related to the historical, socio-economic and cultural conditions of these periods. They co-exist as general spatial frameworks across time that encompass and host diverse systems and organization networks. At different space-time coordinates one level-state may predominate to the expense of the others depending on the degree of intensification of the flow and organization of information within a given system (Figure 1).

Figure 1: The infotype level-states of the system of information.



The Era of Romanticism. The *Era of Romanticism* is predominated by the intensification of *spatial practice*. The perceived physical space is the main domain of the negotiation of information and social knowledge (actuality). At this *level-state* the system of information is characterized primarily by the authenticity, and subsequently by the simplicity and originality of its components. The *Era of Romanticism* would probably characterize socio-spatial formations of primary and basic organization, where the networks of information are almost non-existent or just emerging, where communication of the information is scarce and elementary, and where social transformation and change is time-consuming. It is an era of potential progress and development as a result of social exploration, error and trial, based on the unhindered ‘freedom’ of information.

The Epoch of Ersatz. The *Epoch of Ersatz* is characterized by the intensification of *representations of space*, in which information is disputed, infected and dominated. The *Epoch of Ersatz* signifies the ‘conceptualized space’ of the system of information. The social during the *Epoch of Ersatz* is constituted through the control and exploitation of information. Information is classified and categorized into controlled knowledge and defined signs and codes are responsible for the construction of ‘social reality’. During this *level-state*, the system of information becomes redundant with the elements of unpredictability and entropy being controlled. Informational constructs are generated through imitation and floating signifiers define the limits of social experience. Reason and logic dominate social action and change. The *Epoch of Ersatz* can probably apply to developing and developed patterns of organization, with well established networks of communication. This would be a system indicative of experimentation, justification and potential exploitation of choices and alternatives.

The Age of Chimera. In the *Age of Chimera*, fantasy becomes the predominant component of the system of information. Information becomes illusive, provocative and hyper-real. The *spaces of representation* become intensified with the original authenticity of the *Era of Romanticism* and the ‘original’ simulations of *Epoch of Ersatz* becoming incorporated and assimilated in the domination of lived experience. The system of information shows a highly complex organization, with ‘reality’ being encoded, and ‘hyper-reality’ being decoded as the dominant socio-spatial dominant. At this *level-state* the system of information is dominated by the rejection of authenticity and originality, by increased tensions of imagination and hallucination, and by the emergence of distorted spatial formations. The system of information reactivates its entropic tendencies within a system environment alternating between states of chaotic organization and of organized chaos. The *Age of Chimera* is a period of subordination to the code of the system of information which controls and regenerates ever-emerging spatial realities. The *Age of Chimera* is intensified in advanced modes of organization characterized by networked flexibility, flexible networking and infinite possibilities of communication. Change and transformation is fast and at its extreme leads towards the fractalization of the system of information.

Virtual Implosion

The theoretical approximation of *Virtual Implosion* of the system of information intends to describe how the system of information transforms (mutates) to a fractal system, where meaning is replaced with the ambiguity of ‘relations of meaning’.

Information. The systemic organization of *Information* before *Virtual Implosion* is strongly related to ‘meaning’. *Information* can be considered as segments of communicated knowledge concerning particular facts, subjects, or events. Any set of data, out of which information is constructed, is in essence an abstract flow of

electronic signals, which are coded and exist in various forms. These coded data sets are defined here as ‘fragments of data’, whereas, the components of a system of information as ‘fragments of information’. Fragments of data make up data, data make up fragments of information, which, in turn, can form a system of information, which presents systemic characteristics. A set of *Information* is in essence a system of information.

Phase spaces of virtual implosion. *Virtual Implosion* takes places in a series of continuous, infinite loops of dynamic change, expressed in distinctive phase spaces, and repeated in alternating and interrelated iterative cycles. During *Virtual Implosion* abstract flows of electronic signals, coded as information, undergo quantitative and qualitative alterations within trajectories (phase spaces) of mutation. These phase spaces lead to the fractalization of information, by reproducing irregular, contradictory and chaotic distortions of the original. These fractal informational simulations may be simplified, distorted, controllable and programmable versions of the original information.

The *Virtual Implosion* of the system of information is characterized by three phase spaces of fractal mutation: (a) *Syghysis* (deconstruction): With *Syghysis*, a relatively ordered group of components (fragments of data or fragments of information) of meaningful information is deconstructed into the individual components; these are then rearranged randomly, in disorder, around a core reference point and within the boundaries of the information environment; (b) *Molynsis* (differentiation): *Molynsis* follows the phase of *Syghysis*. During *Molynsis* each one of the randomly dispersed individual units (data) start to differentiate acquiring diverse degrees of emphasis, prestige, and structure, of similar dimensions; and, (c) *Photococciasis* (reconstruction): As a result of *Molynsis*, with *Photococciasis*, the differentiated stress applied on the constituent units of information, generates a non-linear stretching of the components towards a disorganized reconstruction of fractal dimensions.

Fractal. The *Fractal* systemic condition of information is an irregular, disorganized mutation of communicated knowledge. In contrast to the original, meaning-related system of information, the fractalized system of information consists of repetitive distortions of facts, subjects, or events, without any specific or necessary reference to meaning, truth or reality, other than the reference to themselves. The structural architecture of a *Fractal*, accounts for the exhibited vulnerability, fragility and anomia, whereas the irregularity of the patterns of interactivity accounts for the potential manipulation, controllability, and programmability. The later may regenerate distorted versions of an original, and disguise it as the original itself. The viral character of the fractal neutralizes and liquidifies the original translation, and its scandalous behaviour produces false recognition of the original system of information.

Fractal Dynamics

The three phase spaces of the *Virtual Implosion* of the system of information to fractalization are controlled and interconnected by five powerful micro-processes hereby collectively termed as *Fractal Dynamics*: (a) *Catastrophe* (destruction) generates the *Syghysis* of *Information*, by breaking down, deconstructing, the components of the system to fragments of information and data; (b) *Orgasm* (excitement) completes *Syghysis* and powers up *Molynsis*, by generating random mobility of the components of the system of information; it forces them to rearrange in the periphery of, but still within the prescribed limits, of the system; (c) *Metamorphosis* (transformation) concludes *Molynsis* and initiates *Photococciasis*, by producing levels of differentiation among the fragments, and assigning to them various degree of emphasis and substance; (d) *Epigenesis* (rebirth) signals the end of *Photococciasis*, restructuring the differentiated fragments by exercising flexible non-linear stretching on them towards the *Fractal* phase of the system; and (e) *Anomia* (lawlessness) secures the fractalization of the system of information by the irregular disorganized reconstruction of the stretched components.

Infogramics

With *Virtual Implosion* and *Fractal Dynamics* always present at the generic level of systemic organization, *Datagrams* and *Infograms* are informational constructs and patterns of informational organization at a smaller scale, which may as well be understood as basic or complex concepts, definitions, attitudes, opinions, beliefs, ideologies, theories, bodies of knowledge, in general, any organized or non-organized (around meaning or relations of meaning) system of information.

Datagrams. *Datagrams* are basic and simple informational constructs of symbols, icons, signs, figures, characters, letters, numbers, archetypes, and so on. They may generate infinite combinations within their native environment to add more informational units to their system. The self-similarity and plurality of the components of datagrams accounts for, and appends to the ‘meaning’ entailed in the datagram. Datagrams may interact with other similar or not datagrams, in infinite combinations, to produce infograms.

Infograms. An *Infogram* is an informational construct of higher level of complexity than that of a datagram. An infogram can be generated from interacting datagrams but is not necessarily the sum of the source datagrams. Infograms present multi-dimensional patterns of organization of spatial symmetries and structural non-linear curves. They can be said to represent, at varying degrees of complexity, concepts, definitions, ideas, perceptions, explanations, descriptions, segments of information, bodies of knowledge, and so on. According to their origin of their constituent components (combined arrangements of datagrams or other infograms), infograms are distinguished as:

Authentic infograms (strong relations of meaning, resistance to foreign interactions); *Simulated* infograms (visible imaginary versions of authentic infograms); and *Fractal* infograms (simplified, distorted, and programmable version of authentic or simulated infograms and of 'dubious' meaning)

Endogenesis and Exogenesis. *Infograms* (and *datagrams*) present distinctive patterns of organization which account for the inter-relativity and interactivity of infogramic systems. These organizational patterns are here defined as *Endogenesis* and *Exogenesis* respectively. *Endogenesis* refers to the innate tendencies of the structural condition of the infogramic system to self-relate, generate and maintain a stable and enduring structural architecture of meaning around the core theme characteristic of the system. Three levels of structural condition characterize the endogenous associations of an infogramic system: *Organization*, *Lethargy*, and *Disorganization*. *Exogenesis* refers to the tendencies of the infogramic system to communicate or respond to incoming communication with its environment. Exogenesis expresses the tendency of the system of information to associate, to establish networks, and to progress to further evolvement. Three levels of structural involvement characterize the exogenous interactions of an infogramic system: *Simplicity*, *Apathy*, and *Complexity*. In any state of infogramic activity or inaction, the system is balanced as endogenous associations establish a condition of *heterogeneous homogenization*, whereas exogenous interactions, on the opposite side, apply a condition of *homogenous heterogeneity*.

Conclusion

In the era of digital and information communication technologies, information and social knowledge gradually implode into programmable fractal hyper-realities. The proposed model of *Infogramic Analysis*, I contend, can account for the fractalization of information and knowledge and can act as a methodological response for the analysis of learning with ICTs and learning processes within ICT educational settings. *Infogramic Analysis* can be useful in identifying the patterns of gradual deconstruction, differentiation and reconstruction of digital information and knowledge, and their gradual mutation towards abstract fractal infogramic systems. The virtual implosion of learning with ICTs and within ICT educational settings in the digital era is one exemplification of the fractal fate of contemporary life. Learning is powered up by the catastrophe of non-conformity to the dominant ideology and status quo of digital capitalism. It is led to an orgasmic state of intensities and extremes, promoted and marketed through the world media and hyperspace. It provides us a metamorphosed view of the world of opposing and contradictory landscapes, one of secure existence and futuristic technological progress and one of instability and misery and of no visibly better future. New epigenetic forms of learning emerge continually, making ICT educational settings

and learning environments more problematic. How and what we learn is not up to us as much as it is to the fractal fate of our infogramic hyper-real selves.

References

- Andoniou, C. (2008). *Fractal fetishes: Essays on the organization of the system of information*. VDM: Saarbrücken.
- Foucault, M. (1986). Of other spaces. *Diacritics*, 16, 22–27.
- Lefebvre, H. (1991). *The production of space*. Oxford, UK and Cambridge, MA: Blackwell.
- Soja, E. W. (1996). *Thirdspace: Journeys to Los Angeles and other real-and-imagined places*. Oxford: Blackwell Publishers.
- Wilson, M. I., & Corey, K. E. (2000). *Information tectonics*. Chichester: Wiley.