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DOI: 10.2478 / rae – 2022 – 0040 Review of Artistic Education no. 24 2022 339 - 348

12. TO BE, OR NOT TO BE (INFORMED)? AN UNTHINKABLE CHOICE

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Abstract: *The reported research refers to the implications of Information Theory, Information and Communication Technologies and Applied Ontologies, in the educational process, in general, with specific attention to artistic education. We emphasize the major role of the informational methods for knowledge organisation, calling on such concepts as shared use and interoperability of information, in the context of the recent teaching and learning paradigms shift. Three contributions with significant potential are introduced: an extension of the navigationist paradigm and two formal methods, aiming at improved information processing for teaching and learning in the arts, with a new perspective on the definition of the work of art.*
Key words: *Art education, Information Theory, Applied Ontologies, work of art*

1. Importance of being knowledgeable about '**Information**'

An important fact determined by the appearance and almost universal imposition of computing technology (the computer but also its derivatives, such as the computer network, an entity that assumes a major role, visible especially today in the age of social networks and blockchain) is the increased emphasis on the notion of 'information'. Whenever there is a change or transformation (of a state), a transport of content (movement, communication), the idea of information comes into play. The notion of change underlies an intuitive definition of information: "information is a distinction that makes a difference" (MacKay 1969 *apud* Floridi, 2004, p. 44); Bateson's formulation (1973, 428, *apud* Floridi, 2004, p. 44) seems more memorable: "… information, or in fact the basic unit of information, which stands out" (in the original language it is a play on words which thus becomes memorable, while maintaining its scientific accuracy: "In fact, what we mean by information –the elementary unit of information– is a difference which makes a difference".

The word 'information' is believed to derive from the Latin 'informatio / īnfōrmāre' (to inform), meaning 'to provide something with a form', also in the sense of 'to give form to the mind', 'to instruct', 'to teach'. For a detailed etymological perspective, see Capurro and Hjorland 2005. In human society, some notable incipient forms of manifestation, at a rather high level of complexity, of informational systematics were the spoken and the written languages. They contain structural and relational elements described today by grammars, and the ideas of language and grammar further extended to other more complex social manifestations, including the sphere of arts (artistic language), the sphere of sciences (scientific language). Among the first significant varieties of methods for organizing the informational content, we find the systematizations made in the field of biology (taxonomies, initiated in the 18th century). Eventually, in the twentieth century, through the writings of some salient scientific personalities, the systemic

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'vision' or 'approach' was imposed (Ramage 2009, Schweighauser 2014), that is, an organized method of studying, constituting, envisioning coherent entities, similar to those which exist in the surrounding nature or identified in human thought.

The artists and the art critics, in close connection with the results of scientific research and philosophical thinking of the time, given the nature of their creative practice, were equally concerned with aspects of information systematics (namely, techniques, technologies, themes, artistic genres, specific languages) but also of systematic aspects that support the development of creativity. A significant case of transgression of the systemic approach from the science to the arts sphere, with the consequent assuming of the systemic context, is the establishment of the current named 'Systems Aesthetics' (Burnham, 1968; Shanken, 2013).

Like most theoretical research based on technological achievements, Information Theory has emerged due to the major interest in the study of telecommunications media and networks, the related technology taking advantage of large funding and thorough applied scientific research. Thus appeared the Shannon-Weaver model of technical communications (Shannon et al, 1949) which, briefly introduced, consisted of: transmitter, message, channel and receiver. It was further improved by taking into account some structural components and processes (coding-decoding, noise, succinct elements of semiotic message processing, shared repertoire of signs) that intervene in the phenomenon of communication which is understood as a social interaction to transmit information.

It is important to emphasize that this universal model of communication, especially in its evolved variants, augmented by complementary theories, is perfectly valid to be used in the case of artistic communication, of course, with the necessary amendments (namely: creator, artistic message, artistic environment, perceiver of art, cultural references). It is actually used, along with elements of semiotics and visual grammars, to perform a significant part of the study of phenomena specific to artistic creation, communication and art experiencing, also being applied in the teaching of the field. Recent research on the semantics of information (Floridi, 2004; Brier, 2015) are certainly currently bringing the informational approach closer to the needs of areas (such as art) in which elaborations on the meaning of the message are of paramount importance.

2. Systems and Applied Formal Ontologies – a short review

Depending on the field of interest, the notion of 'system' receives various definitions, with some more or less relevant differences. In the present research we endorse a simple but fair definition: a system is an entity made up of hierarchically organized component parts that interact with each other according to a set of rules, so that the overall function as a whole is manifested, which is essentially different from the functions of the component parts that may exist separately. For further reading, see Reynolds and Holwell, 2010 and Shanken 2015. A system is a category of functional entity which is based on information and is made up of component parts, as well as the set of interaction rules. The systemic vision has also acquired an important place in the field of arts (artistic creation and arts theory): "In the past our technologically-conceived artifacts structured living patterns. We are now in

transition from an object-oriented to a systems-oriented culture" (Burnham, 1968). Also see Shanken 2015.

A particular case of system, for which we show interest in the context of the research detailed in this paper, is the 'model', namely an abstraction that represents an equivalent of the physical or non-physical system that is under scrutiny (target system). In general, a model is a 'representation', an equivalent, a projection, a reduction of some 'reality'. There is no general theory regarding modeling (Ritchey, 2012) so every type of application should consider its own work strategy. Modeling (translating an entity into a construct that is easier to work with) is applied to systems (physical or abstract) of varying magnitude and complexity, both in order to achieve operational structures useful to be exploited (industry, ICT, bio-medicine) but also in order to understand certain pre-existing structures or processes, phenomena, or in knowledge acquisition, data mining, image recognition, etc.

In order to create an equivalent, a representation of the entity under study, the target entity is firstly analysed, broken down into components, processes, relations (whole-part, dependence, interaction); secondly, a synthesis is realised (not a simple enterprise!) to make the 'model'. It includes, with certain unavoidable limitations, the reasonable amount of 'knowledge' about the target entity. In the same way that the universality of the concept of 'information' can be noted, it can be estimated that modeling occurs in most contexts and situations where information processing is performed. Knowledge acquisition, of course, is a procedure in which modeling intervenes in multiple stages and takes various forms (accessing information, through perception and thinking; processing it, by applying methods; storing and organising information in the database).

Models and modeling occupy a central place in artistic creation but also in art theory, as well as in didactics dedicated to the arts. Examples at hand are: artistic languages, artistic techniques, art theories, teaching methods, etc. For further reading see Liu 2017 - visual aesthetic perception, Pelowsky 2016 - psychological models of art experience). Awareness of their status as models (systematization of information) and the detailed knowledge about these models assists acquiring of increased skills to operate them with the best results.

A more versatile and effective method of systematically treating information than the systemic approach is the use of an 'applied ontology' (AO). In the case of highly complex systems, which are found in areas such as bio-medical or industrial informatics applications, the study of organization management, the semantic web, the involvement of 'applied formal ontologies' (AFOs) is recommended. (Munn et al 2008; Staab et al 2009) The applied formal ontology concept resulted as a solution to address the complex issues that lend themselves to formalized descriptions. Recent far-reaching development of AFOs is presumably due to the unanticipated limitations of the 'expert systems' which are "computational systems that emulate the decision-making process by a human expert" (Leondes 2002) being intensively addressed in the post-war period.

AFOs are formalisms (methods based on information systematization) that are often implemented through computer programs and are dedicated to solving problems that come from well-defined fields, more or less broad, but which can be

described coherently. Thus, a bio-medical application will be differentiated from an industrial application. The best known application to the wide public refers to the Semantic Web or Web 3.0 and aims to bring the Internet to the stage of a fully descriptive entity through the language of computing technology (make Internet data machine-readable). AFOs exploit the results of the Philosophical Ontology and the scientific contributions that substantiated it were based on the writings of important philosophers (Guizzardi et al 2008). While the applications may differ from each other because of the specific domain to be addressed or effective implementation, the method in general is based on some interusable processing frameworks which are somehow predesigned adaptable solutions, some of them free to use.

Because of the multitude of scientists who worked with AFOs and the widespread application range, there are many definitions for an AFO, but the most usual ones are those of Gruber and Guarino. According to Gruber, 'an ontology is an explicit specification of a conceptualization' (Gruber 1993). Guarino's definition says that "An ontology is an engineering artifact constituted by a specific vocabulary to describe a particular reality" (Guarino 2009).

AFOs are built to make use of concepts (classes, terms), instances (individuals), relations and axioms in order to achieve their specific goals which pertain to a wide range of applications, like ontological analysis, conceptual modeling, knowledge engineering, knowledge management, information-systems development and semantic technologies in general. The role of AFOs is to solve problems by adequately modeling of acquired knowledge and moreover to support efficient shared use of results (interoperability). Some simple examples of AFOs (in increasing complexity) are: Catalog, Glossary, Taxonomy, Thesaurus, (Relational) Data Base. For recent AFO research in the domain of arts, see: Harpring 2010 (cultural objects), Carboni et al 2019 (cultural heritage), Damiano, 2019 (ontology of drama). For a general overview on AFOs, see Roussey 2011.

While the most of the AFOs are implemented by computer programs and they prove themselves to be quite successful solutions to complex tasks, we choose to retain the overall *modus operandi* of the AFO as a processing framework and strategy, in order to propose a general information processing method for the humanities, rather equivalent to the 'systemic view' but somehow having increased capabilities. We contemplate this as a 'way of thinking', a way to keep in mind the systematics of an AFO as a framework for our thought while addressing some complex problem in the humanities, here with direct reference to the arts. This manifesto will be dealt with in Section 4.

3. New technology, New Media, new paradigms in action

The knowledge-based economy and information society established in a decisive way as a consequence of a long evolution in which discoveries in the field of technology and science have made essential contributions to societal evolution. Going beyond the scope and depth of the industrial revolution, the change brought about by information and communication technologies has a major impact, digital technology claiming its status as a 'cultural paradigm', a position that ensures its

prevalence across society and extends all the way to the personal life of the contemporary individual. For further considerations see Floridi 2014.

Along with science and applied disciplines, 'the digital' (as a tool for work or as a medium *per se*) took over of a large segment of the art production (New Media) and other art related activities: theory of arts, didactics, pedagogy, art criticism. Art is a form of communication, a source of knowledge and a manner of performing research. Although art making and creativity involve, in some proportion, still non-elucidated phenomena considered by human psychology, explicit information in the form of knowledge and procedures is successfully used in artistic creation process, in art teaching and learning, also in the art appreciation (see Baroncini et al 2021; Carboni 2019; Liu et al 2017).

The teaching and learning paradigms evolve to keep the pace with the ICT and status of the knowledge resources, which are more and more oriented to a 'networked digital culture'. Researchers identify "new pedagogies" that include 2.0 Learning, Connectivism, Communities of Enquiry, e-Learning and e-Pedagogy (Beetham, McGill and Littlejohn, 2009 *apud* de Oliveira 2015) and Communities of Practice, Curriculum Development and Rhizomatic Knowledge, Collaboration and Meta Cognition (Attwell and Hughes 2010 *apud* de Oliveira 2015). Formal education is complemented by "a new ecology of learning experiences based on the ubiquity of the learning experiences enabled by ICT", also "the concept of Learning Spaces (Leander, Phillips, & Taylor, 2010)" and "use of learning portfolios and personal learning environments (PLE – Dabbagh, Kitsantas 2012; and Castañeda, Adell 2013)" are mentioned. Joint construction of knowledge (by the participating actors in a student-centered didactic process, involving also stakeholders and specialists) is a new paradigm endorsed by the networked information society (de Oliveira 2015). "Knowledge production is making room for what we can call knowledge configuration." (Brown 2015) The 'networked culture' calls for one more dramatic paradigm shift, namely towards 'navigationist learning': *I argue that navigationism might be the new learning paradigm that lies beyond constructivism. In a navigationist learning paradigm, learners should be able to find, identify, manipulate and evaluate information and knowledge, to integrate this knowledge in their world of work and life, to solve problems and to communicate this knowledge to others.*[331]

Knowledge produced by any form of exploration needs to be well organised, so we have to know what strategies are currently used for this purpose; our solution is detailed in Section 4A. Tapia-Leon and co-authors, in a quite recent study, reveal the results of a research interrogating the use of AFOs in universities: these instruments for knowledge representation, operating and exchanging information are widely used, in a large variety of implementations and having a potential major impact on curricula design and e-Learning optimisation. (Tapia-Leon et al 2018) ICT and applications are also extensively employed in the arts universities, ensuing encouraging outcomes (see ELIA art schools international organisation[332]) which add value to the established principles and methods of academia.

[331] Brown 2006
[332] https://elia-artschools.org/

4. New perspectives on informing the arts

In the spirit of aforementioned ideas, we recommend the applied ontological vision and the systemic vision for addressing various issues that fall into the fields of artistic creation, teaching and learning, pedagogy for the arts and arts theory. Of course, for such obviously complex areas of activity, it is not the case, for the time being, of high scale computational implementations, but only to apply a particular thinking strategy which takes into account the basic ideas, principles and methods specific to this type of approach. At this stage of research we announce three new contributions which impact on the informational perspective regarding the arts making, teaching and appreciating.

A) In agreement with the navigationist learning paradigm (Brown 2006), and considering the aforementioned research on AFOs, we advocate that the resulting body of knowledge should be integrated, at learner or institutional level, using a methodology inspired by the applied ontological approach, more or less formalised but, by all means, rather well organised. Information resulted from knowledge production initiatives at individual (scholars, domain specialists, researchers) or institutional level and also from knowledge configuration (external, networked sources) should be merged under a semantic system characterised by shared use and interoperability. A solution could be in the form of a content-addressed relational knowledge database operated with a content management system.

B) We propose an upper level conceptual framework that should govern the approach to address the education, the pedagogy, but also the artistic creation and research, the art theory. The envisaged general methodological framework is built of sections that illustrate the main pillars of philosophical reflection (philosophical ontology, epistemology, phenomenology, aesthetics, ethics and morality). The general framework defines the main dimensions that any particular discourse (in making or speaking about art) should consider, in an attempt to properly address related information in a coherent integralist way.

It is easy to see that the methods and the contents in the professional fields mentioned above are already tailored to refer in one way or another to the main philosophical pillars, because they are looking for answers to problems that can be summarized by questions such as: what exists? under what conditions does it exist? what can and should be known, in what way (how) and for what purpose? how do we relate to what exists, from an experiential point of view? what are the ethical issues involved? what are the applicable value judgments? how do we approach the aesthetic and what options do we have?

If we analyse carefully the various approaches practised in the professional fields that we deal with in this paper, it can easily be observed that often, not for lack of resources, the effective discourse is following some niche while this general framework mentioned above is mostly obscured. Although these niched information is extremely useful and professionally valid, there is a risk that the final result could be deficient as some dimensions were ignored (as an example, the ethics perspective is unclear) and which, subsequently, may prove to be of the utmost importance.

Consequently, we make a plea for the adoption of this general conceptual framework defined by the main pillars of philosophy, taking into account the fact

that philosophy itself as a whole can constitute, with certain contextual adjustments, a solid framework to govern any human professional or personal endeavour, assignment or task. This framework (in the sense of a top level systematics) is complex enough to allow customization for any area of interest, any current duties we may have in our day-to-day work. The practical solution is to customize this framework to the issue addressed, giving due weight to certain perspectives (coming from ontology, phenomenology, axiology), but without losing sight of other perspectives that, although with lower emphasis, could have a certain contribution which cannot and must not be ignored.

C) At the heart of the previously discussed topics is the work of art, to which all the actors in the involved fields of interest relate: the art creator (learner or professional); the teacher; the pedagogy specialist; the art critic; the art theory researcher. In previously reported work (Grigoraș 2011; Simionescu and Grigoraș 2011) we proposed the use of the systemic view for the work of art analysis (reception / understanding / description) and synthesis (creation, exercising creativity), based on a presupposed equivalence between the work of art and a theoretical generic system. In the light of the recent research about the role of AFOs in interusable knowledge representation, reported by authoritative researchers dealing with most various and complex problems across a wide range of disciplines, we resolutely assert that the work of art should be considered in terms of a model system, a complex, multidimensional informational structure, able to integrate a wide range of features.

This should be the ideal framework to cope with addressing the work of art, from any occupational perspective. At the same time, there is a need for a proper customization during the effective use by adapting the general model to the most significant aspects. Some particular model system is built up, identified, on the basis of a pre-existing work of art, through art appreciation and art criticism, offering a tool to be operated during teaching and learning. Knowledge about art making is likely to be easily conveyed with the help of this species of constructed models. Under the same strategy, art creation is building a work of art by growing a model, informed by previously acquired knowledge, operating on systemic variables which define the final artistic product (material or immaterial).

The benefits of this unified model for the work of art are various but the main one is the unification of the said professional perspectives (teachers, art critics, art theorists) with the view of the learner or art creator. Most of the theories about creativity in the arts are biased because they originate from outside the artist's studio, but the artist needs to know how to exercise creativity. The unified model for the work of art is such a tool that is believed to support exercising creativity in the arts because it's an informational system that can be precisely operated by the artist all along the process of art creation. Moreover, this generic model is also capable of integrating knowledge coming from the most recent developments in neuroaesthetics (Shimamura 2012, Starr 2013), psychology (Barr 2018, Beatty et al 2014, Pelowski 2016), embodied aesthetics and enactivism (Scarinzi 2015), and any scholarly research that may come out. Research which elaborates on these contributions will be further reported in a series of forthcoming papers.

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