A SYSTEMS BASIS FOR NEW MEDIA PEDAGOGY

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Abstract

The relations that operate dynamically within art making systems need to be elucidated when teaching new media either as practice or as history. Toward that end the author proposes an extended conceptual structure of cybernetics that includes the motivations within a system and its coherence.

Art that uses ‘new’ media is fundamentally different from older forms of visual art because it takes a collaborative infrastructure to produce; it is the nature of this collaboration that I want to discuss so as to provide a basis for its teaching in new media courses.

Making new media artworks involves a network of artists, technologies, technical and other collaborators, funding institutions, curators and exhibiting structures, all functioning concurrently in a context of cultural, political and technological strata, such that:

- The people involved become a system of entities in multiple relationships.
- The operating process is communication, consisting in relationships generating feedback-loop structures in the system.
- These relationships between individuals, ideas, actions and productions continually form and re-form.
- These dynamic systems develop an intrinsic stability gained through their capacity to handle variety and perturbation.
- When they function adequately they become autopoietic and, thus, self-sustaining.
- In general such a system is motivated by desire in one or many of its multitude of types.

All the actors that constitute a collaborative system may be represented as nodes in a network of relationships that show bi-directional inter-activity. Individuals influence each other or produce things that influence others by reinforcing or dissuading certain ideas and activities. These take place in cultural contexts which are also actors in the system. Books, exhibitions, productions, budgets, politics, censorship, cultural mores, institutions, technicians and critical discussion all form the cultural/political context in which artists are influenced.

Systems operate over time and possess a dynamics by which the system is maintained in spite of perturbation and assault, evolution and development, criticism, politics and denial of opportunity or support. Systems theory may be applied to groupings of people with common intentions functioning over various periods of time within diverse socio-political situations. Such an application can then account for the ways social groupings are spawned, function and break up, often spawning new versions in opposition, or in a spirit of “we can do it better”.

Around 1967, the idea emerged that artists, their artworks and audiences could be understood as a complex whole. Both Jack Burnham, in the US, and Roy Ascott, in the UK, wrote about the use of cybernetics and systems theory in understanding kinetic, installation, performance and conceptual art. Burnham’s approach developed from Ludwig von Bertalanffy’s systems theory, which emerged from studies of self-regulation in theoretical biology [1]. Burnham then applied this approach to art-works based on the interactive relations that make for stable and on-going systems [2]. These consist in a complex arrangement of processes both organic and technical and may involve complex relations with the audience, thus requiring extended temporal engagement. Meanwhile Ascott, using Norbert Wiener’s cybernetics [3], realised that artworks might ‘behave’ and invite participation, and that they might be interactive, thus engaging in ‘conversation’ with the audience, through a loop of feedback [4].

Both Burnham and Ascott recognised that systems theory helped in understanding the dynamics that lie behind many types of art and the cybernetics of audience interaction with responsive artworks, and it remains useful in this way. However, they did not explore the particularly collaborative nature of art making. Making, too, partakes of cybernetic processes and it is here, I suggest, that the teaching of new media art should take into account the cybernetics of social interaction when it involved the development of new works. These cultural systems possess certain characteristics, namely:

- the relations formed from feedback structures, among the participants in the system
- the motivations that drive the system’s intentionality as described under the notion of desire, and
- the autopoietic closure of the system in its capacity to continue itself as a self-sustaining, self-regulating system.

Relations

Norbert Wiener developed cybernetics to aid in the pointing of anti-aircraft guns during WWII, but he quickly recognised that it was applicable in many areas of machine control, e.g., the thermostat, and more interestingly that it was analogous to the behaviour of animals and people in many ways. For example, communications necessitates interaction mediated by feedback between entities—human and machine—that allows the requirements of each to be taken into account.

When information is transmitted between entities and the entity receiving the transmission is able to decode the message, then communication occurs and, in a certain sense, a measure of control has been effected between them. This communication then becomes cybernetic when the receiver of the message responds, returning a message to the original sender and closing the loop of information.

The kinds of relations that operate are of two general forms, linear-causal (or feedforward) relations and circular-causal (or feedback) relations.

Feedforward relations in human groups consist in the issuing of a stimulus, such as the giving of orders or the publishing of texts or artworks. The effect is one of influence while there is little means for response.

The majority of relations that are fundamental to human systems are feedback relations, which consist in the provision of a proportionate response to a stimulus, e.g., in conversation.

Feedback modulates the behaviour of the source in ways that are permitted by its construction. When the feedback is a function of some sort of comparison and inhibits the system through being subtracted from the input, then the system is said to reach a level of control. In biological systems, feedback relations are useful in the maintenance of dynamic homeostasis, e.g., in thermo-regulation, osmotic pressure, posture. That is, feedback allows a system to maintain its coherence when perturbed, e.g., keeping a collaboration oriented towards making an artwork.

Intentionality

The notion of feedback assists in understanding the structural dynamics of a system, but it does not elucidate how collaboration evolves within it. This is a matter of intentionality and motivation, and here it is useful to introduce Deleuze and Guattari’s notion of the ‘desiring-
machine,’ which they consider to be an aspect of their ‘machinic phylum’ [5]. Given that a machine is, in effect, a system of linkages among components, a social system is a machine that operates through relations, i.e., communications and interaction between people and tools, which (1) are made up of recurrent circuits (i.e., feedback), (2) act “through real distinctions in an ensemble” (i.e., information), and (3) produce “the probability of a less-probable” (i.e., organisation, or new states of lower entropy) [6].

As motivational forces, “desiring-machines are indeed the same as technical and social machines, but they are their unconscious, as it were: they manifest and mobilize [desires, intentions] that ‘correspond’ to the conscious or preconscious [interests] of the economy, the politics and the technics of a specific social field” [7]. The ‘desiring machine’ is the ensemble of individuals and tools that constitute a system of relations driven by individual intentions and the tools’ offerings. The operatives in the machine are embedded in the machinic phylum as agents of desire. Thus Deleuze and Guattari’s conception of the machinic phylum is not the tools and machines that we use, but that of a dynamic network of technologies and people: an organisation of people, devices and institutions in a collective network wherein the flow of energy and information, motivated by desire, produces the evolution of the system.

The artist could almost be thought of as a paradigm desiring-machine but for the fact that the desiring-machine exists at the interactive social, rather than individual, level. As Deleuze and Guattari note: “What defines desiring machines is precisely their capacity for an unlimited number of connections, in every sense and in all directions”[8]. That is, artists (as desiring machines) are rhizomatic, proliferating sequential, coupled interactions having impacts in the world, in varied ways, on themselves and on others as systems in process with other surrounding systems.

The types and qualities of relations in the desiring machine are crucial. Desire, generosity, multiple idiosyncratic behaviours drive the process, building it. It self-organises. New approaches and discoveries energise it, producing inventions. Thus the collaborative process can be seen as a “machine,” a system that functions through multi-layered feedback processes operating between individual nodes in the network; the organisation of the machine. Desire is the driving force that motivates the collaboration.

**Autopoiesis**

Deleuze and Guattari’s framework is a (psycho)analysis of the intentionality in the system, yet they do not adequately articulate it as a whole process. Their analysis, while useful, ultimately misleads because the system is a single, whole process and we need to understand how that comes about.

The layers of interaction and feedback in a collaborative system afford its internal components an integrated and sustained existence in the face of environmental perturbation. This leads on to Humberto Maturana’s concept of autopoiesis, which offers a basis for self-organisation within biological systems [9].

Following Maturana: for a system of entities possessing a range of available relations, its history selects its evolution. The kinds of changes that the system undergoes are constrained by the kinds of processes that the environment experiences. It may also be perturbed by changes in the system, which then feed back into the behaviour of the system itself. If the organisation of the components of the system is sufficiently plastic then it will accommodate any perturbation through the range of its possible behaviours. Thus, in collaborative art-making, two or more autopoietic systems, say an artist and a technologist, each acting as a medium for the other, become mutually ‘structurally coupled’ through the history of their reciprocal interactions. Behaviours in one system ‘triggering perturbations’ in the other bring them into an interlocking interaction that becomes a ‘consensual domain.’ Conversations can be described as an “interlocked, mutually selecting, mutually triggering domain of state trajectories” [10], as can collaboration, on a larger scale, and I argue that these are both autopoietic.

The determination of the consensual domain provides the boundary conditions through the range of terminological agreements that the members of the system have made, and it is this boundary that constitutes the autopoietic closure of the system.

**In Conclusion**

I consider a collaboration to be constituted of several participants who are coupled through their mutual interactions in a consensual domain. That is, a collaboration emerges out of the context of conversations and desires among the members of a system. Each participant in the system may then influence the others through their capacities for recognition and response. A collaboration maintains and continues itself through the productions that these interactions generate within it as a result of consensually determined potentials where there exists the willingness to subsume personal intentions to those of the collaboration and there is a suitable supply of available feed-stocks (e.g., cash flow).

In a sense, I am proposing a new kind of art theory, not of aesthetic interpretation but of making. It is effectively a theory of the interactions required to produce an artwork under the conditions in which artists are collaborating in dealing with new technologies.

I suggest that this notion should not be spelt out explicitly, within the actual processes of teaching, lest students become bogged down in the analysis of the relations entailed in their own art-making. However, it should inform the teaching of collaborative practices, preparing the student for the role of production manager as much as producer, while at the same time providing as much exposure as possible to the full spectrum of Art and Technology and liberating the thinking so that new, as yet un-thought-of, modes of art work might appear.

**References**

6. Ibid., p.118.
7. Ibid., p.118.
8. Ibid., p.121.