ON LITERATURE AND SYSTEMS THEORY

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WHAT IS "SYSTEM THEORY" ANYWAY?

The topic of our discussion, "literature and systems theory", naturally brings up two questions: First, what "systems theory" is, second, what it has to do with literature. The answers, I am afraid, are anything but clear. First of all, it seems more appropriate to speak of "system theories" in plural instead of "system theory" in singular, since a whole number of scientific and cultural theories can be called "system theories":

(1) *General Systems Theory* with its multiple filialitions from Ludwig von Bertalanffy to Niklas Luhmann. I will try to describe and explain it in more detail.

(2) *Cybernetics* as the theory of regulation and interaction of man-machine systems as taught by Norbert Wiener. General Systems Theory was closely related to cybernetics, but has a broader focus.

(3) *Metamathematics* as, among others, the investigation of recursion [1] If we bundle metamathematics with *Artificial Intelligence Research,* theoretical computer science and aesthetics, we get the particular systems theory of Douglas R. Hofstadter's *Gödel, Escher, Bach*

(4) Claude Shannons *Information Theory* which technically defined information through the signal-noise ratio.

(5) *Systems Analysis* which as a field of engineering analyses the functioning of technical systems.

(6) Chaos Theory.

(7) Finally (or rather: first), *occult and hermetic holisms* from Pythagorean world harmony, neoplatonic cosmology to alchemy and astrology which all read the world as a system of material and symbolic correspondences and interrelations.

All these system theories intersect, most of them or the historical products of technological innovation in the 1940s and 1950s.[2] As General Systems Theory by its very name claims to be the umbrella systems theory, I would like to sketch its concepts and history in more detail.

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[1] according to Steven Cole Kleene, but going back to Gödel's proof.

[2] I suspect that the "systems theory" we discuss tonight is an electic mixture of all the above, but inclined towards the comparison of technical information systems and literature.

History and concepts of General Systems Theory

Bertalanffy's General Systems Theory. „General Systems Theory" was coined in 1949 in a book called „General Systems Theory" by the Austrian-American biologist Ludwig von Bertalanffy who saw it as an interdisciplinary device and holistic approach.[3] General Systems Theory was meant to be capable of describing any phenomena in terms of their structural organization. Since a biological organism could be analyzed as a system just as, say, a political community, General Systems Theory was intended to bridge the gaps between science and the humanities.

In the version of Bertalanffy and his followers in the 1950s and 1960s, General Systems Theory was mainly about the difference between open and closed systems. According to Bertalanffy, open systems communicate, have a metabolism and exchange their components in order to compensate entropy. Closed systems on the other hand are subject to entropy. According to Bertalanffy, closed system exist only in theory, not in reality.

The most straightforward artistic emulation of early General Systems Theory I know are the early sculptures of the German-American artist Hans Haacke, now better know for his political installation art. In the 1960s, Haacke closely collaborated with the art critic and theoretician Jack Burnham whose writings, although virtually forgotten, may be the first thorough application of systems theory on the study of art. The earliest of Haacke's 1960s "realtime systems" (as he called them) is the 1964 *Condensation Cube* (picture?). It is a simple glass cube whose ground is covered with a film of water. Whenever spectators enter the exhibition space and rise the room temperature, the water which condensates and generates patterns on the glass. The artwork consists less in the (seemingly closed) object itself than in the process that involves object, spectators and the surrounding space. If one identifies these agents as components of a system, the system itself stabilizes it through its metabolism, ori, to put in Bertalanffy's terms, it's in a "flow equilibrium" [Ber75].

With or without this example, the implied politics and philosophy of Bertalanffy's General Systems Theory are easily recognizable: It is a humanistic theory concerned with openness in the broadest sense. Nevertheless, the attempt to parallel biological systems to social systems and vice versa remains problematic and was heavily criticized, as I will describe soon in more detail.

A discourse closely related to General Systems Theory and its holistic thinking is environmentalism.[4] And although Bertalanffy emphasized that the holism of General Systems Theory was strictly scientific,[5] the occult comes into play as well. Fritjof Capra, the inventor of "New Age", had his roots in General Systems Theory, other systems theorists had affinities to "New Age" philosophy as well.

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[3]General Systems Theory, he writes, begins with Aristotles' assumption that the whole is more than the sum of its parts.

[4]As James Boyle pointed out at the *CODE* conference in Cambridge, the notion of "the environment" didn't even exist before the 1950s and 1960s.

[5][Ber72], p.21

Maturana/Varela and the theory of autopoiesis. With the writings of the biologists Humberto Mutarana and Francisco Varela, General Systems Theory became subject to a major paradigm shift in the early 1970s. Unlike Bertalanffy, Maturana and Varela did not categorically rule out the viability of closed systems, but stated that partial, or "operational" closure does occur in all living systems. This observation was linked to a new concept Maturana and Varela introduced into systems theory, namely that of self-generation or "autopoiesis". Autopoiesis simply served as a descriptor for autoreproductive processes in living systems, i.e. cell-division and growth . But there was a broader implication; namely that recursion, or self-reference is a not only a mathematical, but a general systemic phenomenon that also occurs in every living system, including the mind. Thus applying the the trope of autopoiesis to the human consciousness, Maturana and Varela concluded that reality itself is a mental and therefore subjective invention. So they reinvented idealistic philosophy on new grounds, a position that became labelled "radical constructivism" and popularized by the Austrian psychologist and bestseller writer Paul Watzlawick.[6]

GENERAL SYSTEMS THEORY APPLIED TO LITERATURE

The intersections between systems theories and literature are diverse, yet could be put into two major categories:

(1) systems theory as an analytical method in literary studies, and, as Hans Haacke's *Condensation Cube* demonstrates, in art itself.
(2) systems theory as a descriptor for structures in art that parallel structures observed in social, biological and technical systems — like autopoiesis, self-reference, entropy, openness, closure.

"System theory" as an analytical method in the humanities: the influence of Niklas Luhmann. When we talk of "systems theory" as a method in the humanities and in literary studies, we inevitably have to talk about Niklas Luhmann. In the country where I come from, "systems theory" is a household name in the humanities and social sciences, and is exclusively identified with Luhmann. Few people that there is other systems theory than Luhmann's. Niklas Luhmann was a public administration consultant before he became a sociology professor, and his experience with complex bureaucracies seems to have profoundly shaped his individual offshoot of General Systems Theory.

In the late 1970s, Luhmann applied Maturana's and Varela's concept of "autopoiesis" in natural systems and applied it to social systems. Substantially modifying Maturana's and Varela's theory in the process,[7] Luhmann ended up with a somewhat melancholy and sarcastic notion of autopoietic systems. He saw all social systems like administrations, governments, and even economics, art and science, as fsystems that are not concerned with anything else but themselves.

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[6]whose book "How Real is Real" on disinformation as reality manipulation many of you I am sure have read. See also [Wat81]

[7]While in Maturana's and Varela's theory, an observer constitutes the difference between a system and its environment while standing outside the system itself, Luhmann made the observer an integral part of the system he observes.

They are autopoietic in that their actual purpose is to further and reproduce themselves.

Luhmann's theory of autopoietic systems of course sharply contradicts Bertalanffy's theory of open systems, and in its ideological implications, it even sharply contradicts Maturana's and Varela's notion of autopoiesic systems. Jürgen Habermas was the first who attacked Luhmann, criticizing that

- Systems theory is questionable as a biologism that projects biological structures on social structures;
- Luhmann's theory of autopoietic systems is politically reactionary as it negates any possibility of social change.

It might be a proof though for Luhmann's theory that this very critique made him a famous and enormously influential thinker at least in Germany.[8]

While Luhmann was a sociologist indeed, it appears to me that also the non-Luhmannian attempts to employ systems theory as a literary theory [9] always boiled down to sociology. Systems theory helps to analyse how "art" and "literature" work as social systems, but in my view hasn't proven yet to be usable for analyzing texts and artworks themselves. There might be, however, an exception: namely those artworks which are autopoietic systems themselves.

"System Theory" as a descriptor for structural parallels in social/biological/technical systems on the one hand and art on the other.

Systems Theory and Narration. Autopoiesis, recursion, self-reference and self-reflexivity have frequently been observed in art and literature, they are also common to literature and technical systems, which brings us back to the motto of our panel. While recursion and self-reflexivity are by no means exclusive to contemporary art and literature, it seems that the contemporary arts are practically *defined* by being formally self-reflexive.[10] I would like to leave it to my fellow panelists Robert Coover and Jeff Noon to check this claim against poetical practice, and just give you a brief example:

> "ONCE UPON A TIME THERE WAS A STORY THAN BEGAN"
> John Barth, *Frametale*, [Bar68], p.3:

What you see is the first chapter of John Barth's book *Lost in the Funhouse* from 1968. The reader is advised to cut out the phrase and fold it as a Moebius strip. It thus becomes an infinite recursive story, a story that, like the song of the dog in

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[8]It is I think no exaggaration to state that Luhmann has been and still is widely considered the most important contemporary thinker in Germany. Until his death two years ago, he wrote a series of voluminous books which in their overall organization and range of topics covered remind of Kant's three *Critiques*, extending the scope of Luhmannian systems socioanalysis to all fields of human production. Despite the intellectual brilliance and dry-humored wisdom of his writing, he remains a disputed, oddball figure in the field of systems theory, from whose scientific reputation (at least in humanities) he borrowed much without emphasizing his own modifications to it.

[9]like in the "radical constructivist" school of "Empirische Literaturwissenschaft" of Siegfried J. Schmidt at Universität Siegen

[10]Although Friedrich Schlegel used the same criteria for defining romanticism — his contemporary art — in the 1790s

the kitchen, opens up itself as a narrative subframe which in turn opens up itself as a narrative subframe, and so on.

The *Frametaile* is not only a poetic recursion, and a very dense one, it's also a recursion about recursions framing a whole field of self-reflexive narrative plays. Robert Coover's short fictions "The Babysitter" (1969), whose sttory iterates into multiple branches, and "Spanking the Maid", where the sexual becomes textual through repetitions and permutations of the narrative, are seminal texts in this field. Other examples are the fiction of Jorge L. Borges, Thomas Pynchon and Italo Calvino, but also more popular works like Tom Stoppard's plays, Robert Altman's movie "The Player", the "Scream" horror movies and their knock-offs, to mention only a very few.

Borrowing from computer programming, we could say that all those narratives execute themselves in infinite loops. Barth's "Frametale" however a rare example where the code itself — i.e. the letters — loops with the narrative. In all the other books and movies mentioned, the text or the filmstrip itself is finite and loops either in fixed number of repetitions (as Robert Coover's "Spanking the Maid"), or it loops only on the meta level of its self-description.[11]

Systems Theory and Autopoietic Language. We thus have to differentiate recursive structures on the meta level of narration from recursive structures on the very object level of the letter, or the code. To give an example: Borges just *describes* the Library of Babel as a total body of text, he doesn't actually write all its books. There are poets who actually attempted the latter, like the German 17th century poet Quirinus Kuhlmann who wanted to build a mechanical device writes all present and future books of mankind.[12]

In Europe, permutational poetry whose text modifies itself is known since almost two millenia. With Mallarmé, Dada and concrete poetry, its tradition was revitalized in modernism. In the discussion, we could talk about Robert Coover's occupation with hypertext literature. Of course computer programming, algorithmic music, Net.art and software art have to be mentioned here as writings of self-generative code.

Conclusions

Narrowing the topic of system theories and literature to formal recursions and self-reflexivity, we approach what I see as a common-sense definition of "postmodern" aethetics and poetics. As we know, system theories are not the only ones providing the appropriate descriptors. The same phenomena can be described, perhaps even in more detail, using the poststructuralist text theory of Michel Foucault, Julia Kristeva and Roland Barthes.[13]

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[11]And this often makes up their sophistication.)

[12]The Lagado chapter in Swift's *Gulliver's Travels* is, just as Borges' story, only a metanarrative of such a project.

[13]With which one could describe John Barth's "Frametale" not just as a particular systemic phenomenon, but moreover as a statement about the infinitude of all textual narration and reading. This, in my view, would doubtlessly do hermeneutic justice to this particular story and with its particular title.

Systems theories and poststructuralist theory can therefore be seen as two competing paradigms for the study of the arts and culture, two paradigms with backgrounds in completely different academic disciplines and schools of thought. The question is whether systems theories enable us to speak about reflexivity in art and culture in a more precise and formally more rigorous manner than other cultural theories. One has to bear in mind here that General Systems Theory was never rigorously scientific in the first place, but seems to be misread as hard science in the humanities.

One should therefore not rule out, I think, that literature writes its own systems theory, instead of just adapting other system theories. Thomas Pynchon's novels come into my mind here, and again John Barth who introduces the idea of narrative recursions versus code recursions (although he doesn't use this terminology), in his classical essay "The Literature of Exhaustion". This essay, written at the same time as the "Frametale" and later perceived as the manifesto of American "postmodern literature", matches experimental artist books by Dick Higgins, Daniel Spoerri and Ray Johnson against Jorge Luis Borges' fictions, concluding that the former perpetuate an exhausted mode of modernism exactly because they put recursion into the object code instead of the meta narrative.

So it seems that, when we discuss literature and systems theory in the light of digital media and digital art, we are forced to go back to the 1960s and a controversy which for me describes one of the most interesting, still unresolved ruptures in contemporary art.

References

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