World on a Wire: Towards a New Theory of Emergence in the Sonic Arts

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[Play scene a from *World on a Wire* - Vollmer “You are only someone else’s image of you.”]

That was a scene from Ranier Fassbinder’s 1973 dystopic sci-fi miniseries *World on a Wire.* In this clip you hear a troubled computer programmer, Henry Vollmer, expressing a sentiment that is echoed by other characters who begin to suspect that their world may be no more “real” than the virtual reality they have created inside a supercomputer. When I first saw the program last September during its limited theatrical release in the US, I was struck by its visual feast of kitsch and near-future modernism. But I found especially compelling its audacious synthetic soundtrack - used to great effect by composer Gottfried Hüngsberg to underscore the story’s critique of the tenets of cybernetic discourse.

The soundtrack to *World on a Wire* actually merits a full analysis of its own, but today I am going to discuss how the subject of Fassbinder’s critique – cybernetics and systems theory – has informed the principal narrative in the sonic arts since John Cage. My purpose is to suggest a new approach to reading these works that doesn’t rely on reductionist, holistic, or teleological attitudes.

In the mid-20th century, against the backdrop of the Cold War and the advent of computer technology, the branch of systems theory know as cybernetics was presented as a way to study control and communication within complex systems. Although its origins are in mathematics and military engineering, this conceptual paradigm also captured the imaginations of the burgeoning counterculture and its most forward-thinking artists.

Central to cybernetic thought is understanding everything from organisms to organizations, human minds to “nature” as self-regulating systems that seek equilibrium, or homeostasis. Cybernetics was critically examined as an ideology earlier this year in a documentary series for the BBC by Adam Curtis, called “All Watched over by Machines Of Loving Grace.”

According to Katherine Hayles, cybernetic theory, in its trajectory towards posthumanism, has developed through three distinct stages. She marks the stages in terms of a shift in focus from control and homestasis, towards autopoiesis and emergence, and later towards virtuality and embodiment [1].

These stages share a holistic view of systems that sees information as separate from matter - and in some ways *more real* than material reality. Whether one claims that systems self-regulate and seek stability via feedback, or that they self-generate and produce complexity, it seems to be assumed that the system’s behavior is somehow greater than the sum of its parts. Is it possible to understand complex behavior without assuming that what we witness is greater than the parts generating it?

I am a musician and composer, and for the past 10 years or so I have worked with electronics, software, and interactive technology. I have noticed that in my field ideas about emergent behavior and intelligent systems are taken for granted, and the discourse for developing and critiquing this work is shaped by the ideology we have inherited from cybernetics.

To be clear, I enjoy making art with complex systems and emergent phenomena. But the research I have been doing in this subject has been inspired by a desire to look honestly at how we are accustomed to interpreting systems-oriented work.

What are the political and social implications of a practice that embraces system design, indeterminacy, and the axis between chaos and control? Once examined, can we say

that these ideas (or perhaps more importantly the attitudes these ideas represent) serve us in grave political and ecological times?

Perhaps there is a better way to engage with the phenomena that we perceive as systemic behavior. The work of literary theorist Timothy Morton and others working in object-oriented ontology provides a framework that avoids holism, reductionism, determinism, and idealism. This view is in the lineage of flat ontology, and it considers everything to be an object - electrons, smartphones, soundwaves, planets, sonatas, dust particles, Republicans, and so on. The lists of outrageously disparate objects that object-oriented ontologists are fond of making are also objects, as are the object-oriented ontologists themselves.

Objects may contain other objects, like a Russian nesting doll, but the whole doll is not greater than its parts. In an object-oriented ontology, the parts are neither dispensable nor replaceable, and they have autonomy and interconnectedness with other objects. Objects have sensual experiences of other objects, meaning that objects also have qualities that are withdrawn and inaccessible to these relations.

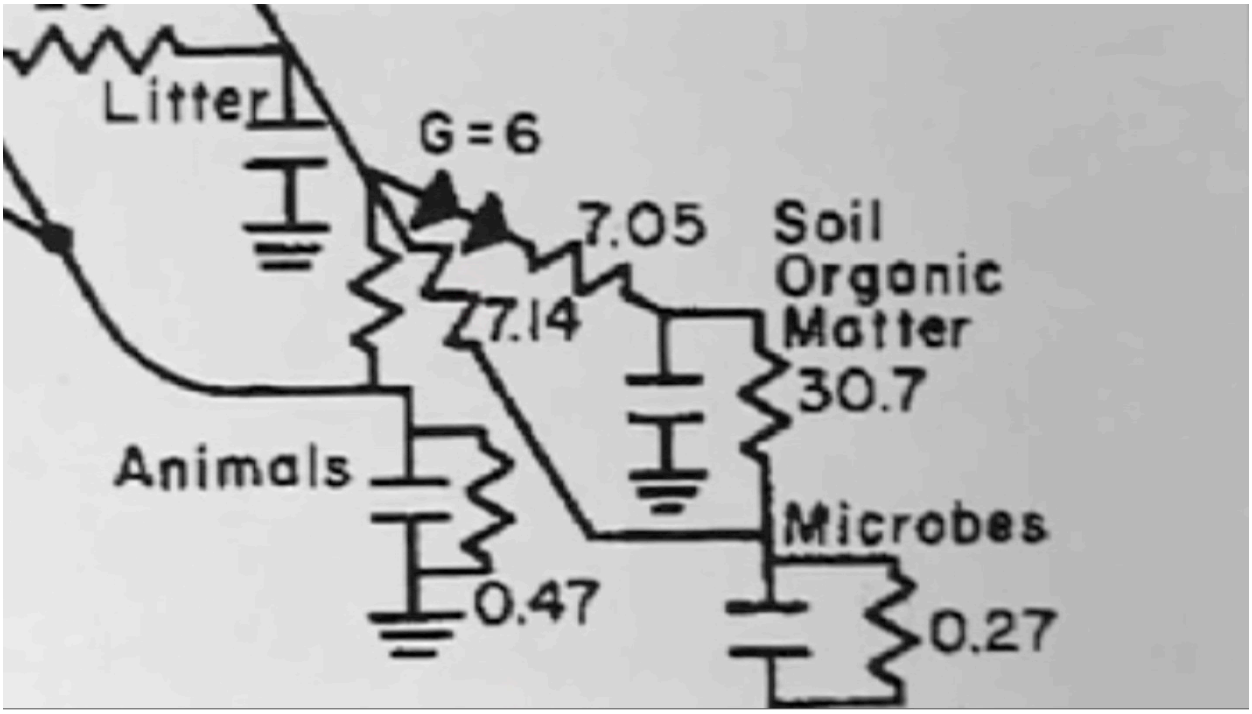
For example: an audio speaker and the sound wave that excites it are undoubtedly in a sensual relationship. Yet the waveform only experiences the specific range of the speaker's movement that it's frequencies excite. And the speaker only experiences the spectra of the waveform's harmonic content that electronic circuitry can transmit. Each has qualities that are withdrawn from the other, in spite of their interconnectedness.

Without the undermining of reductionism or the overmining of holism, "the world is enough" as object-oriented philosopher Levi Bryant says.[2] Objects are not defined by their relationships, because the relationships between them are objects too, and so are the systems in which the objects participate.

In the systems-oriented sonic arts, the virtue of holism has not been questioned with much rigor, as far as I can tell. However, in a conversation with Bay Area computer

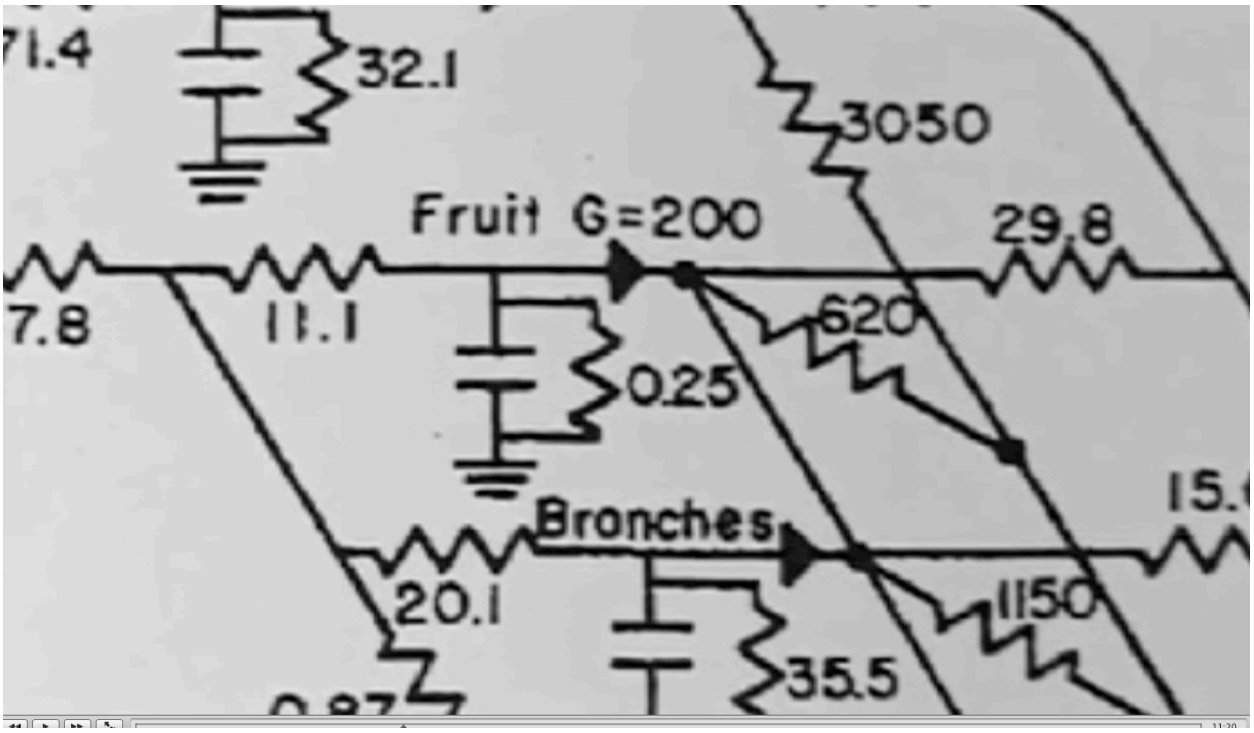
music pioneer John Bischoff, I was reminded that the social backdrop of his formative years was the upheaval of the late 1960s and 70s and the spectre of nuclear annihilation. The systems theory inspirations of the 60's counterculture provided a hopeful alternative to the monolithic state and corporate entities that seemed to be so fully in control of daily life.

Media theorist Christina Dunbar-Hester notes that although artists like John Cage, Brian Eno, Bebe and Louis Barron, and Herbert Bruhn espoused the ideas of Norbert Wiener and other early cyberneticists, the work of these artists spoke more to the attitudes and concerns of the second wave of cybernetics [3]. Gregory Bateson and Margaret Meade refer to this stage as second-order cybernetics, in which they recognize open systems wherein observers are also actors. [4]



Returning to the mind-machine analogy in early cybernetics, consider the work of Howard Odum - an early cyberneticist and founder of the field of ecology. At this time (the 1950s) the primary concern was developing an understanding of systems by

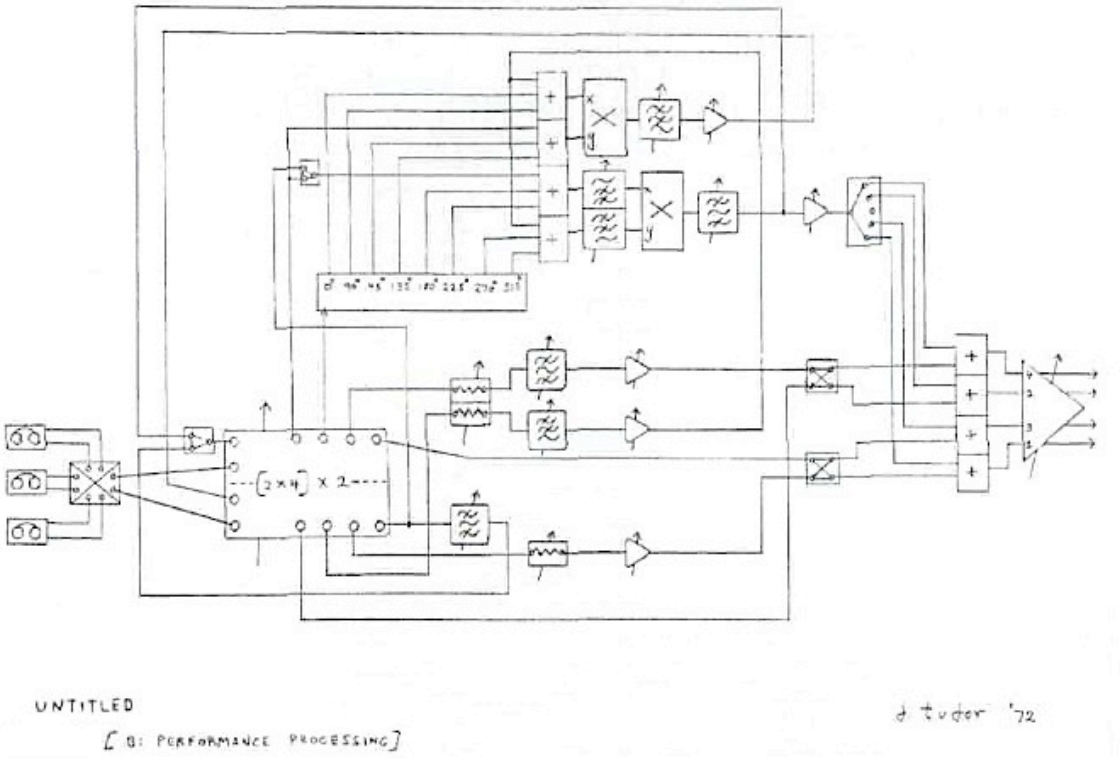
means of modeling, and promoting the idea of the mind as a network - and correspondingly seeing “mind” in systems. Odum was taking the analogy of the mind as a network further by drawing schematic diagrams of ecosystems, actually using the symbols and syntax of electronics to represent the pathways and processes within and among life forms.



When I saw images of Odums’s models in Curtis’ documentary I was immediately reminded of David Tudor - an artist who Dunbar-Hester doesn’t mention, but whose influence on subsequent generations of systems-oriented sonic artists cannot be overstated.

Known for his meticulous work in preparing and scoring piano performances of Cage’s indeterminate compositions, when Tudor transitioned into working solely with electronics he began to represent his own compositions as schematics. Tudor’s works for live electronics consist of complex, often recursive networks of relatively simple audio circuits, designed to elicit unpredictable behavior.

Fig. 1. Performance patch diagram for *Untitled (Homage to Toshi Ichiyanagi)*, 1972. (© Estate of David Tudor)



The sonic result of Tudor's work - while perhaps conceptually inspired by early cybernetics - has a remarkable, living quality. But we don't hear the sonification of a closed system correcting itself via feedback - far from it. Tudor is the participant-observer, perpetually tweaking the circuits as he finds new ways to excite them into thumping, squealing, vocalizing, chattering; and yes, feeding-back. His pieces truly evoke characters and presences, or "sonic entities" to borrow a term from Bay Area electronic musician Tim Perkis. [5]

Tudor approached his practice with a quasi-spiritual rigor, and is known for describing the systems he created - often on the day of a concert through many hours of improvisation and adjustment - as systems with inherent intelligence, that had to be coaxed and then allowed space to emerge.[6] But the physicality of Tudor's sonic

entities problematizes a tendency in cybernetic discourse identified by Hayles - the disembodiment of information.

The customary way to read Tudor's work is to frame it in the language of second-order cybernetics. And Tudor's interest in bringing out the immanent - if withdrawn - qualities of his systems does seemingly place his work within this conceptual framework. However, I think Tudor's sonic art may have foreshadowed the more contemporary view of object-oriented ontology, and his work can be read in this way.

What is a Tudor piece if not an interconnected "mesh" – to borrow Morton's term – a mesh of configurable objects in sensual relationships with one another? Remove one object or add a new one and the piece is not the same – it may even implode, or explode - a performance of his piece "Toneburst" famously ignited the speakers of an old theater in Buffalo. And these sonic entities – can we not view them as Morton's "strange strangers," so-called visitors with whom we have an ethical imperative to engage on their own terms? This is the ecological experience of a systems-oriented work, in my opinion.

Although I agree with Dunbar-Hester that much of systems-oriented sonic art draws from the ideas attributed to Hayles' second wave, I would argue that all three stages are present in this field, often overlapping. While Cage's indeterminate scores and utilization of randomness may have produced radically different results with each performance of a piece, certain cybernetic-inspired process-oriented works by minimalist composers tend towards stasis and stability as they seek out common tonalities and resonance.

And virtuality makes its mark in the sonic arts even before the first experiments of Jaron Lanier and his cohort, as in Rich Gold's late 70's piece *Finnish Hall*, performed by Bay Area computer network ensemble The League of Automatic Composers. *Finnish Hall* is actually the 8-bit sonification of a virtual terrain, as explored and translated into tones by the "Terrain Reader" program Gold wrote on his KIM-1 microcomputer. [7}

A League piece is configured as a network, an open system that the members of the ensemble approach as an instrument. The players – all of them programmers and circuit hackers to some degree – are first and foremost improvising musicians. The recordings disclose a process orientation – the pieces begin mid-stream, and end with little regard for closure or resolution.

Although at times sonically dense, League pieces usually contain discrete voices - entities that overlap, playfully and violently collide, and trigger other entities - almost as if these sonic entities are themselves the “Automatic Composers” of the group’s name. On first listen, it is difficult to hear beyond the grainy 8-bit surface. With late-70s computer technology, resolution and timbral complexity had to be compromised in order to generate and control sound in real time. But to my ear the rawness of the sounds lends to their unique identities as sonic entities, and to a sense that one is having an encounter with the uncanny, as Morton describes encounters with the strange stranger.

That artists might be fascinated with indeterminacy, process and emergent phenomena should come as no surprise. Tim Perkis and John Bischoff were members of a community of electronic musicians affiliated with Mills College in the 70’s and early 80’s who are widely acknowledged as the first to employ micro-computer and network models in their work.

The generation of Bay Area sonic artists that included Bischoff and Perkis, who both were members of the League and later The Hub, have a unique place in this history. Bischoff studied Electronic Music at Mills College and studied under David Tudor and Robert Ashley among others. So Bischoff and his associates are quite directly connected to the Cage lineage - they are arguably the next generation in the American experimental tradition.

They also happened to mature as artists at the same time and geographical place as the explosive growth of the US tech industry seated in Silicon Valley, and only a decade after the same part of the country became the epicenter of the 60’s counterculture.

As Bischoff and Perkis write in the liner notes to the League of Automatic Composers' retrospective released in 2007:

> In the air then there was a sense of new possibilities, and the feeling of the need to build a culture from the ground up. For music, specifically, this meant redefining everything about how it's done, from the instruments and tuning systems to the musical forms, venues, and social relations among players and audiences. [Bischoff and Perkis]

For Bischoff, theoretical inspiration came from Bateson and the "synergetics" of Buckminster Fuller, and he was enthralled with the self-sufficient, hacker ethic that he encountered in the burgeoning Northern California tech culture and while studying with David Tudor at Mills. Perkis credits an early exposure to emergence theorist John Holland, theoretical biology, Von Neumann, and Whitehead for his embrace of a systems-oriented approach. But Bischoff emphasizes that musical concerns were always at the fore, and one gets the sense that these individuals were compelled by the promise of a new level of conversation with the work.

The Bay Area at the time was cultivating a strange mix of counterculture radicalism with tech-utopianism and a libertarian strain of capitalism. Richard Barbrook and Andy Cameron label this the "California Ideology."

Although not fully realized until the 1990's, the California Ideology combines the individualism of Silicon Valley capitalism with the holism of New Age spirituality and cybernetics. This belief system is alive and well – it is "in the water," so to speak. And it informs how we approach and interpret experimental sonic art and can be seen in the glorification of cutting edge technology and the drive to appropriate new technologies as soon as they are made available, with relatively little critical discourse.

And yet, as every day brings new evidence of dire economic, ecological, and political circumstances it is now clear that neither the Invisible Hand of the market, nor the free will of creative individuals, nor a self-regulating Gaia/Spaceship Earth is capable of

correcting the course. Morton suggests that a change in thinking is required before real solutions can be envisioned and implemented – what he calls the "Ecological Thought." And I hope to find some modest first steps in my re-listening to the experimental music that has had formative influence on my development as a practitioner.

1. Hayles, Katherine N., *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics.* Chicago: University of Chicago Press, 1999

2. Bryant, Levi. "The World is Enough: On Overmining and Undermining*." Larval Subjects.* 11 Oct. 2011 <http://larvalsubjects.wordpress.com/2011/10/11/the-world-is-enough-on-overmining-and-undermining/>.

3. Dunbar-Hester, Christina. "Listening to Cybrnetics: Music, Machines, and Nervous Systems, 1950-1980," In *Science, Technology, & Human Values,* 35.1 (2010): 113-139.
4. Brand, Stewart. "For God's Sake, Margaret: Conversation with Gregory Bateson and Margaret Mead." In *CoEvolutionary Quarterly*, 10 (1976): 32-44.

5. Perkis, TIm. "Complexity and Emergence in the American Experimental Tradition." In *Art and Complexity*, edited by J. L. Casti and Anders Karlqvist, 75-84, Amsterdam: Elsevier, 2003.

6. Conversation with John Bischoff. 28 Oct. 2011.

7. Bischoff, John and Perkis, Tim. "The League of Automatic Music Composers 1978–1983." Liner notes. *The League of Automatic Music Composers 1978–1983*. New World Records. 2007.

8. Barbrook, Richard and Cameron, Andy. "The California Ideology*." The Hypermedia Research Centre.* 1995. <http://www.hrc.wmin.ac.uk/theory-californianideology-main.html> .