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A Cybernetics and Performance: The Two Roles of Feedback

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Introduction

This paper explores the loose and interdisciplinary academic movement of systems thinking or systems theory as the ideas moved from military research into the hand artist and performer in the counter-cultural movement. The evangelical promoter of systems thinking Gregory Bateson argues systems thinking was a "growing together of a number of ideas which had developed in different places during World War II" that formed an intellectual movement (Bateson, 1972 p. 474).

I will follow Bateson's lead and trace the emergence of systems as it evolved during and after World War II as a philosophy, critical orientation, and practice. In following this movement, I will ground my discussion of systems in the historical term cybernetics and its evolution to second-order cybernetics. The paper will ultimately suggest that second-order cybernetics influenced Avant-garde performance practices and notions of performativity. The central suggestion of the paper is that the ideas of cybernetics evolved, if not flourished, outside of the technical context of the engineer in the world of performance theory and performance practice.

In practicing cybernetics, I will not write in a way that promotes negative feedback by choosing a rhetorical composition that controls historical interpretations of systems theory and cybernetics with a clear definition and defining authority of systems at the beginning of the essay.

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As such, I will not engage in theoretical systems building that promotes a historical authority on cybernetics only to use this theorist or definition to correct for deviance and misunderstanding in the historical application of the term. This is, as the author argues, only one possible path for systems and cybernetic oriented thinking to take. I will choose another option and follow a rhetorical composition that amplifies noises and positive feedback in a suggestive attempt to open up new historical ideas and movements for cybernetics.

To begin, I suggest cybernetics and later systems theory can be understood from one of two vantage points. One vantage point privileges command, control, communication and Intelligence (expressed in the acronym C^3I) and the other vantage point privileges noise and feedback in creating novelty and emergence patterns in dynamic systems. The two vantage points equally describe cybernetics and it is appropriate to say that cybernetics, like the duck-rabbit in Gestalt psychology, is both things at once. The paper suggests that the second generation of cybernetics understood cybernetics from the latter vantage point. Ultimately, the second vantage point emphasizing the role of the observer in embodied communication in such a way that challenged the representational frameworks of knowledge production. As the second generation of cyberneticians left the context of control and command systems they encountered an American counter-culture that embraced cybernetics as a practice and model of performance. Together the new science of cybernetics and a new performance practices challenged an enlightenment ideal of the detached observer viewing and knowing a world from afar.

The Macy Conferences and the Birth of Cybernetics

Most histories of cybernetics locate the birthplace of cybernetics at a series of informal conferences organized by the Josiah Macy Foundation where a network of scholars and consultants from multiple different theoretical and practical disciplines met regularly starting in 1941 until 1960 to discuss the human mind and mental health. Historian and philosopher Jean-Pierre Dupuy (2007) summarizes the conferences well when he writes:

Cybernetics was obliged from the beginning to ally itself with a movement—a political lobby, actually, operating under the auspices of the Macy Foundation—that sought to assure world peace and universal mental health by means of a bizarre cocktail concocted from psychoanalysis, cultural anthropology, advanced physics, and the new thinking associated with the cybernetics group (Dupuy, 2007 pg 22). Dupuy's political lobby grew from an increasing interest in the study of the human mind and mental health after the world witnessed the grotesque scenes of human cruelty of Nazi Germany's Final Solution.

During the war a hope emerged that the study of humanity could help ensure world peace and promote mental health. Attending the cybernetics meetings were government contractors who worked on the practical problems facing the allied war effort during World War II. Practically, the Allies were having difficulties calculating ballistics information for anti-aircraft guns because enemy aircraft were getting faster and more difficult to shoot with land-mounted anti-aircraft artillery. Of course, to perform this task required the interactions of a set of variables including the course of the plane, the plane's speed, and the speed of the rocket. In order to solve the practical problem of anti-aircraft the United States invested billions of dollars to design analog and digital computers to compute ballistics tables and to create control systems for military weapon systems. In this light, the practical problem the early cybernetics group set out to address was the design and construction of control mechanism for complicated weapon systems.

To solve this practical problem, the cybernetics meetings focused on the role of negative and positive feedback loops and the servomechanisms that could detect changes and deviation in a cybernetic circuit. As a result, cybernetics is the study of mutual interactions between components of a system that form feedback loops where information from one time or state of the system is feed back as an input into other part or state of the system to form a non-linear interaction. Cybernetics conceptualized behavior as an interaction of coupled parts where information about previous interactions operated as input to maintain purpose. In any cybernetic system with looped structures of mutual causality, the loops can take the form of either positive or negative feedback. Negative feedback corrects deviation by adjusting variables in order to maintain particular stable states in a system. Negative feedback is conservative and maintains what Ross Ashby call homeostasis or the ability to maintain vital organizational integrity given changes in the environment.

Positive feedback, on the other hand, amplifies deviation in order to produce destabilizing conditions for the system under observation. In positive feedback perturbations leads to run away conditions that often results in moving the system far from a state of equilibrium to the point where the system under observation undergoes drastic changes in its structure and organization. Philosopher Manuel De Landa (1997) in *A Thousand Years of Nonlinear History* correctly understands the two different aspects of feedback when we writes:

The principle characteristic of negative feedback is its homogenizing effect: any deviation from the temperature threshold at which the thermostat is set is eliminated by the loop. Negative feedback is "deviation-counteracting." Positive feedback, on the other hand, tends to increase heterogeneity by being "deviation-amplifying" (Landa, 1997). Manual De Landa continues to argue that community emerges as a combination of two historical processes where communities are always moving between meshwork of self-similar aggregates and hierarchies which create institution and organizations. One process is based on negative feedback and conserves and stratifies social organization into social structure while positive feedback destratifies social structure by connecting with an unorganized flow of energy.

Historian of performance Jon Mckenzie (2002) in his landmark history of performance theory, *Perform or Else*: *From Discipline to Performance*, compliments De Landa's analysis by arguing that after the 1950's when notions of cybernetic feedback emerged the central focus in intellectual life and analysis shifted towards a paradigm of performance in cultural, technical and social performance that placed the unit of analysis on the process of feedback (McKenzie, 2002). Jon Mckenzie rightfully notices that performance scholarship tends to over look the twin elements in performance by focusing on the creative world making aspects of performance while overlooking the more conservative aspect of performance; thus, performance theory overlooks the twin aspect of feedback as either positive or negative feedback.

In addition to notions of positive and negative feedback, the historical assessment of cybernetics should note how radical the model of mind, cybernetics developed, of effective computation embedded within physical networks was for those experiencing it for the first time in the 1940's and 1950's because it challenged a view of a detached mind separate from a material body.

Dupuy (2007) suggest a radical thing happened at the Macy Conferences when the cybernetics group eliminated any discussion of subjectivity or anything that remained particularly human in the causal processes under investigation. Dupuy contends cybernetics for the first time in the history of science began to explain how efficient causes, the ones allowed by science, could emulate final causes, teleos, intention, and purpose by a kind of algorithmic thinking. Cybernetics rallied it seemed around a historically strange and scandalous phrase in teleological mechanism which implies that mechanisms or algorithms (physical causes) when embedded in circular feedback loops can emulate and produce final causes such as purpose, intention, consciousness, and will (Dupuy, 2007).

The model cybernetics developed of an embodied mind is not, Dupuy is quick to correct, based on the computer as a model, and was not based on assumptions of representation. Although the cybernetics research largely produced the first computers, it is historically inaccurate to assume that computers were available as models of mental processes to the early pioneers of cybernetics. Instead, Dupuy argues cybernetics mechanized the mind and made a mathematical model out of consciousness.

Dupuy (2007) contends that the result of creating an embodied model of the mind and consciousness was to decenter the human and made the human less central to consciousness. Creating a model of the mind denied anything special about the human mind and brought the human down into simple mechanical computation of physical effective causes. For Dupuy (2007) cybernetic ideas denied anything unique about the human at all which resulted in the deconstruction of metaphysical humanism that created an "ally of the first order" for the French deconstructionists across the Atlantic who would come to develop an engineering style of thought and celebrated a subjectless cognition (Dupuy, 2007, p. 18).

Esalen Institute and the rebirth of cybernetics

If traditional histories of the first generation of cybernetics developed at the Macy Conferences with a focus on solving applied military problems in ballistics, then a counter history could focus on The Esalen Institute and Lindisfarne Association's Cathedral of Saint John the Divine in New York as sites for the rebirth of cybernetics. Both locations offered an opportunity for cybernetic ideas to engage the counter culture and emerging environmental movement.

For example, unlike the military contractors and context of war, Esalen is an exotic location where New Age philosophy, human potential, yoga, psychedelics, and naked bodies came together at the naturally formed hot springs on the coastal bluffs of Big Sur, California. Esalen became a classroom and intellectual institution where poets, artists, and philosophers have come for residencies and lectures for the last forty years.

Founders Michael Murphy and Richard Price "envisioned Esalen as a kind of intellectual ashram" where "western and eastern thinkers and practitioners could meet in order to fuse the best of both cultural visions and create a new way of being (or indeed becoming) human" (Kripal & Shuck, 2005, p. 9). Esalen focused on non-traditional and non-dogmatic approaches to religious life and learning. As a counter culture location, Esalen reimagines the connection between body and mind by stressing embodied forms of knowledge. Kippal and Shuck (2005) contend that at Esalen, an intellectual historian may find "a deep appreciation for the human body as the privileged site of the sacred. … At the same time, we discover the acceptance of intellectual and corporeal practices side-by-side" (p. 5). Esalen is the most prominent location for the counter history but The Cathedral of Saint John the Divine in New York offered an opportunity for the Lindesfarne fellows to hold public discussions and lectures on ideas of feedback and cybernetics.

The generation of cyberneticians who filled the lecture circuits of Lindesfarne and Esalen focused on the role of the observer *within* the system under analysis. The second generation of cybernetics because they focused on the role of the observer in looped cybernetic systems of feedback referred to themselves as second-order cybernetics. Although a complete history of second-order cybernetics is out of the scope of this paper, I offer Gregory Bateson and Francisco Varela as two representative examples of a new focus on embodied subjectless cognition.

Gregory Bateson, present at the Macy Conference and then a resident for ten years at Esalen championed a cybernetic epistemology that squarely located the observer within the causal loops of ecological and cybernetic processes. The western observer, Bateson (1972) argues, was plagued with an obsession for true representations and for objects to exist outside of mutually determining feedback processes. Bateson argues communication produces the myth of subject and objects.

The self, Bateson insisted was an erroneous abstraction from the looped cybernetic process of mutual feedback that is difficult to undo. Bateson (1972) acknowledges that a new ecological worldview is not easy and risk psychosis with his illustration of a cybernetic circuit that includes himself:

We observe that the axe flies through the air and makes certain sorts of gashes in a pre-existing cut in the side of the tree… but if I am cutting down a tree, I still think 'Gregory Bateson' is cutting down the tree; I am cutting down the tree. 'Myself' is to me still an excessively concrete object, different from the rest of what I have been calling "mind" (p. 458-462).

Yet, the commitment to the abstraction of the self formed for Bateson an addiction to a bad ecology of ideas that promoted the catastrophic idea that humans were separate from its environment. A more appropriate orientation is to assume that the self is part of a larger more encompassing cybernetic circuit and a fundamental error is to subtract on part of the system and to assume it is outside of the other.

The second generation, or second order, cybernetician Francisco Varela along with Humberto Maturana (1991) challenged the representational fetish of western science and early cybernetics by arguing that the mind does not respond or represent a world outside of its own mental operations. The mind does not work as a Turing machine on an input/output matrix, but instead Maturana and Varela insist mind is embodied and it recursively creates micro-worlds and micro-identities from the habitual embodied actions of organisms as they makes and responds to distinctions.

Central to Maturana and Varela's approach is the notion of recursion which is a function or operation involving using outputs of its own operation as an input at a further moment. It is best represent graphically by the figure of the ouroboros, the snake that eats its own tail, where the beginning and the end are connected together forming a closed loop. It is important to note that recursion does not involve an object or subject prior to the operation- indeed recursion is a performative operation that constitutes the subject. The notions of recursion should sound similar to readers in performance familiar with the work of Judith Butler and performativity (Butler, 1993, 2011). Butler (2011) introduces performativity to criticize a vicious closed circle in the split among sex, gender, and now, sexuality.

To address this vicious circle Butler relies on the two processes of performance and performativity to subvert the naturalized assumption of sex. In subverting identity, Butler draws on notions of recursion central to cybernetics. Butler (1997) argues the subject is constituted in a form of twisting and turning back when she states:

In each case, power that at first appears an external pressed upon the subject, pressing the subject into subordination, assumes a psychic form that constitutes the subject's self-identity. The form this power takes is relentlessly marked by a figure of turning, a turning back upon oneself or even a turning one oneself. This figure operates as part of the explanation of how a subject is produced, and so there is no subject, strictly speaking, who makes this turn (p. 3) .

In *Gender Trouble,* Butler (2011) referred to gender and sex, being a sex, and being a gender as involving an impossible "twist of language" or a twisting in language and performance that involves a recursive bending back (2011, p. 25). The bending back does not, for Butler, find and represent a subject but constitutes and creates a gendered subject as a performative accomplishment. Theater scholar Sue Ellen Case (1996) aptly writes that performativity is "a self-iterative function that precedes" (p 5) or as Judith Butler (2007) states , "a figure of turning, a turning back upon oneself or even a turning on oneself" (p. 25). Identity becomes a recursive procedure in which the self is formed in the process of bending back on itself.

Performing recursion: the afterlife of cybernetics in performance

Esalen, in addition to public lectures on cybernetics, was also a location for counter-cultural Avant-garde artists. Making sense of the influence of cybernetics and performance requires again a deeper historical context. Theater scholar Sue Ellen Case (2007) argues Enlightenment science took advantage of the metaphor of the theater to conceptualize the activities of knowledge production into one perspective and gaze. Case (2007) argues that the twin birth of theater and science creates a stable human subject who knows by a stable eye/I the world of objects. This representational practice separated humans from the environment and displaced the element of change onto the environment or the stage.

As a result, two audiences were created the audience of theater and the audience of science; both becoming spectators of change hidden from participation in the rites of change by dimmed either house lights or white coats.

Both audiences rely on the same representational practices of theater. The new science and new theater of the West displaced previous ways of knowing the world. An alternative cosmology of a dynamic world where humans shared the agency of change and were participants in the world gets lost in a representational fetish of the enlightenment science and the theater that underwrote it.

After cybernetics performance practice moved from representation by introducing notions of recursion into artistic composition. Sue Ellen Case (2007) explains cybernetic recursion in the work of Beckett and Cage's performances, in the words, "Beyond the ubiquitous performances of science, avant-garde performance practice took up the mechanistic as a mode of composition. The recursive loop of iteration central to recording devices became a site of emulation and intervention" (p. 126). The art of recursion became central to Avant-garde practices such as Pauline Oliveros who fed magnetic reel-to-reel tapes back on themselves to produce and intervene in musical composition. Burroughs pioneered a cut-up method consisting of cutting piece of writing in random pieces and then rearranging them to produce a non-linear narrative. Case (2007) , elaborating on Beckett's use of recursion in Krapp's last tape, says, "Man and machine are synchronous in their functioning, inhabiting a shared subjective space of recursion that actually defines their functions. Without the recursion, the play or the playing is over" (p 126).

Those close to cyberneticians were also exploring mixed media and experimental non-linear composition strategies. John Brockman Gregory Bateson's literary agent was influential in combining the use of new media and film with performance art—in a practice, he called intermedia. Eleanor Lester (1996) reports in the New York Time reports that

John Brockman, the New York Film Festival's 25-year-old coordinator of a special events program on independent cinema in the United States, plugging into the switched-on "expanded cinema" world in which a film is not just a movie, but an Event, An Environment. This is a humming electronic world in which multiple films, tapes, amplifiers, kinetic sculpture, lights, and live dancers or actors are combined to Involve Audience in a Total Theater Experience.

The New York Times's review is similar to Michael Kirby's (1965) discussions of Happenings a year earlier in the *Tulane Drama Review* where he famously describes Allan Kaprow in cybernetic terms with the words:

Eat by Allan Kaprow went one step further by employing human beings as the "mechanized" elements. The people involved functioned within narrow and well-defined limits of behavior. His or her tasks, which had no development or progression, were repeated without variation. They responded only to particular actions on the part of the spectators–only when their "switch was turned on (p 24).

Later Kirby refers to New Theatre as being non-matrixed and without logical (or illogical) information structure. Dick Higgins (1976), in his famous *American Speech* essay on the origin of Happenings, eloquently states , "All the avant-garde arts tended increasingly to fuse, as artists explored new media … Kaprow made extensive collages, using machines, mirrors that reflected the spectators, and ultimately, live performers" (p. 268). Bateson's close friend Paul Ryan began pioneering the use of video art and cybernetics by investigating video communication technology, particularly the Sony Portapack™ as a unique media. Paul Ryan's Raindance Collective used Sony The Portapacks™ in video installations investigating the effects of simultaneous feedback in cybernetic circuits.

The afterlife of systems then emerges into asking what kind of cabinet of wonder do we understand cybernetics as placing us within? Did systems and cybernetics represent a challenge to the understanding of stable vitalist man observing *his* world or did does it constitute a shift in perspective that situates humans *within* cybernetic processes thus challenging the notion that we are passively observing a world out there? At Esalen Bateson and Varela answered the question of the afterlife by insisting that the world, and you and I in it, are created in an endless interactive process of emergence. The second-order cyberneticians left the creative process of calling forth and imagining a new world to the artists-in-residence at Esalen and it was in performance and performance practice where the potential of positive feedback is best realized.

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