

# Cybernetics as Art

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## ABSTRACT

This paper explores cybernetics as art as well as science. Aesthetics of cybernetics are found in harmony and joyfulness with increasing choice and creativity. Cybernetics is based upon rhythm, change, mutual respect and love, all of which can be found in artistic masterpieces. Reflective and reflexive wisdom generate delight and joy in learning and practices. A cybernetic relationship can be expanded to the cosmic scales of harmony with aesthetical and ethical manifestations of art in a higher order.

**Keywords:** Cybernetics, Art, Love, Dance, Beauty, Delight

## 1. INTRODUCTION

Each chapter of Friedrich Cramer's *Chaos and Order: The Complex Structure of Living Systems* ends with poems. Conrad F. Meyer's "The Roman Fountain," Wallace Stevens's "Connoisseur of Chaos," Roald Hoffmann's "Autumn Entelechies," William Butler Yeats's "Sailing to Byzantium" and other poems cited in his book are all about the dynamic system between order and chaos, and are the structures or patterns of complexity, harmony, and beauty of living systems [1]. This pioneering book provides an insight to build a bridge between art and science, and to review cybernetics or systemics as art as well as science. Cybernetics has been largely regarded as science rather than art, since Norbert Wiener attempted to find control mechanism in the animal and machine in his book *Cybernetics* published in 1948. This regulatory system theory has significantly contributed to the development of such fields as control systems, electrical networks, and mechanical engineering. Though cybernetics has evolved with the appearance of second order cyberneticians like Heinz von Foerster, Ranulph Glanville, and Louis Kauffman, cybernetics has been primarily regarded as a scientific system theory.

This paper attempts to establish cybernetics as art. The purpose of this study is to reorient cybernetics as art by exploring the overlapping areas of art and cybernetics.

Cybernetics will be represented with the semantics of art, as the title of this paper suggests. Cybernetics is not only a science, but also art in which beauty and delight are fully generated and realized. Though art and cybernetics have been regarded as separated field, to trace their convergence brings about insight and delight.

## 2. LISTEN TO THE RHYTHM OF THE FALLING RAIN

Pitter Patter, Pitter Patter, Pitter Patter. "Listen to the rhythm of the falling rain, telling me what a fool I've been." Rhythmic beauty of the falling rain is produced by the duration of the note and varying amounts of the rainfall. Such a rhythm can be noticed from the hammering of a blacksmith, the whistling of the boiling kettle, and the splashing of mill wheels. Yet, it can be found in the organic as well. In every creature, the body functions with rhythmic regularity such as one's heartbeat.

Cybernetics does not heed substance or the empirical facts. Instead, it focuses on the pattern, movement, or form of the objects. When Gregory Bateson proclaims that Newton invented the law of gravity, he notices cybernetics is about form, order, and pattern rather than substance [2]. Forms and patterns generate difference. The difference here is not the quantitative conception with physical dimensions. It separate from the physical world and does not have physical dimensions.

Aesthetics is heavily dependent on rhythmic patterns. Repetitive patterning shapes the order arising from the interrelationship between lines, dots, and notes. As Alan Pipes points out, the rhythm in art and design is the outcome of the "*reiteration*" of elements or motifs that have been systematically positioned around the picture lane" (italics mine) [3]. Here rhythm implies a defined regularity, yet the cybernetic conception of regularity does not mean the absolute sense of order and predictability. As Gombrich points out in *A Sense of Order* [4], humans face a conflict between order and instability, or between predictability and randomness. Unchangeable predictability produces boredom, whereas absolute randomness leads to restlessness. Aesthetic moments occur when many diverse ideas or concepts congeal and

bring a greater part of the distributed mind into conscious experience. In art, different rhythmic patterns frequently merge together to realize a higher order of relatedness. This structured hierarchy is significant in cybernetics where networks of difference create *gestalten* to produce a higher synthesis.

Balance, along with rhythm, is another key conception when cybernetics is interpreted through the semantics of art. Whether it is a formal balance (repetition of similar elements) or an informal balance (fluid and dynamic), art pursues balance. A technical engineer also pursues balance in controlling guided missiles, thermostats, or robots through a self-correcting signaling structure. The broken balance destroys overall harmony and order, and results in ugliness. Recognizing disruption or ugliness is another crucial issue both in art and in cybernetics. They both seek grace rather than domination by the will of humans. Unguided, free will is likely to go toward hate, or the destruction of life. Gregory Bateson believed that cybernetics like art, religion, and dreams, could serve as remedy for the ills of too purposeful views of life [5]. Against excessive individualism and purposeful consciousness, cybernetics offers corrective feedback to maintain homoeostasis. It is in the mind that something new is configured with the euphoria of new insights.

### 3. UNCHANGED MELODIES

Cyberneticians listen to the blowing in the wind and the sound of falling rain, and find patterns or structures behind them. Listening as an insider is unlike listening as an outsider. Cybernetics create rather than merely discovers it. This is why Gregory Bateson argues that the beauty of second-order cybernetics is perceptual and constructive, rather than objective and given. It refuses replicable, objective understanding of an object as the product of the exclusively left-brain oriented mindset. Cyberneticians get to the field and listen to the rhythm of the sounds around them, having a relationship with them as an active participant.

Entering into this kind of a new relationship demands change. Cybernetics offers an integrated intellectual framework for understanding change. Bradford P. Keeney proposes to integrate aesthetics and pragmatics instead of preserving the dichotomy between them in the field of psychotherapy [6]. Aesthetics presents a contextual framework for everyday practical behavior, and pragmatic technique avoids free-associative aesthetic nonsense. Cybernetic epistemology significantly changes society and an individual's mindset and patterns of behavior.

Change requires the creation of a new pattern. Frequently the source of creativity in art traces back to Muses. Though

I do not intend to underestimate the creative inspiration arising from external forces, an experimental aspect of artistic creation is required to genuinely explore. Likewise, cybernetic creativity needs repetitive adaptation of the previous position. Invention as a bottom-up manner can be found in complex systems both in natural and artificial systems. The patterns of the human lung, of tree roots growing into soil, and the road network of expanding cities show creative organic growth. Complicated cities with top down planning are frequently incorporated into a complex structure with a wider bottom up organic design. Thus, an initial structure usually becomes a part of the larger flexible structure.

Flexibility works as a preadaptation for unpredictable change in any complex system. Gregory Bateson defines flexibility as "uncommitted potentiality for change" [7]. In order to create and maintain a healthy system, flexibility should be reserved, thus the goal of ecologists or cybernetics is to increase flexibility rather than exhaust it. Ben Goertzel studies cognitive dynamics from complexity to creativity, and also proclaims that creating a new system by change or generating novelty requires "a looser, more flexible region" [8]. When its landscape is too harsh, generating a new form would be much riskier and thus be inhibited. On the other hand, when the landscape is too flat, too much benevolence will cause aimless fluctuations.

Art in cybernetics is posthuman rather than human. Physical and mental structures of humans are not clearly distinguishable from that of plants, towns, or software products. Aesthetics of cybernetics is deeply rooted in the integration of humans with their environment. To distinguish from humans and nature is no longer possible under posthuman conditions. Unaltered melodies and structures can be found in a coherent, complex system. This pre-existing pattern or melody is incorporated into a more complex system with the advance of an integrated mindset and practice. This is the point where an observer notices the emergence of new melodies with unaltered melodies as sub-systems.

### 4. PERHAPS LOVE

Mary Catherine Bateson's *Our Own Metaphor* has a chapter on cybernetic love, in which love is linked to "diversity." Allowing diversity despite seemingly hierarchical difference means to demonstrate the spirit of love. This love is related to the ethical imperative of Von Foerster: "Act always so as to increase the number of choices" [9].

In cybernetics, love is the term that brings about the attention to relationships. Gregory Bateson frequently uses the term, love, when he attempts to make a bridge between

the primary process and the secondary process, or the structure of unconscious and the structure of conscious [10]. To love means to regard myself as a system and to regard the person whom I love as systemic. In addition, it means to accept that my system and the other's system constitute a much larger system. This systemic understanding of love facilitates the expansion of love to every single creature of the universe. Western intellectual tradition tends to put the ultimate locus of value upon the person as a self-reliant individual. From individual consciousness and willful purpose, point shifts to building a composite made from dynamically related parts. Understanding love from cybernetics means accepting complexities both more and less without reductionism. Instead of focusing on increasing the amount of happiness, the relationship itself has importance.

Being in love entails a willingness to relate what the mind has captured in the way that one part is related to another part for a higher synthesis. Love is the emotional aspect of the mental state of any creature and is related to the unconscious areas of psychology.

All sciences, religion, and art are integrated in beauty. Bateson attempts to show this aesthetics of a larger inclusive system in *Angels Fear*. Beauty in integrated unity is noticed by observing how each part is related to each other for a greater whole. Bateson claims that love is based upon a three-way metaphor. It links not lonely self to the other but to self plus other. Love evokes not only the value of self and other, but also the value of relationship [11].

According to Ben Godrtzel, love is a hybrid supersystem composed of four subsystems: sexuality; caregiving; attachment; and intimacy. Falling in love with somebody is the convergent process of different systems and is the result of complex and non-linearly adaptive interaction between sub-systems [12].

Through dynamics of interactions, a fixed boundary can be transcended, and a meaningful pattern can emerge. One of the most remarkable examples of transcendence is overcoming Freudian romantic love. Instead of being trapped in an Oedipus complex and the following masochistic psychology, one can establish a balanced self-organizing system in which a recurrent feedback loop occurs.

Cybernetic ecology is well aligned with Abraham Maslow's "Being psychology," in which an individual integrates for the greater good. Instead of relying on self-preservation and deficiency-oriented mechanisms, cyberneticians unfold reconciliatory vision, insight, or love, generating peak experiences with awe, wonder, reverence, and even piety [13]. In its culmination, a cybernetic ecologist can escape a violent and aggressive dominated mindset and respect all humans with a loving, integrative mindset.

The rhythms mentioned in the main body of this paper is extended into every living and non-living creature in the universe: "each of us, in the rhythms of his or her body, is like a bird or beast - but also like a pond or a forest or the vast single life of the seas." [14]. Mary Catherine Bateson began her "Diversity and Love" chapter with the passage that she enjoyed the rhythm of the day and finished it with the rhythm of the universe. Love for diversity encourages cyberneticians to discover this rhythm or harmonious structure.

## 5. SAVE THE LAST DANCE FOR ME

Bushman shaman dances with Gregory Bateson with polyphonic singing and clapping says "we shall ever continue dancing together throughout eternity, being both above and below" [15]. Here dancing is art of joy in having an interaction with the other and building an endless circular relationship with the other in cosmic level. In this cosmic dance, binary division is not maintained, for every single part becomes a complementary part in a broader ecosystem.

As Mary Catherine Bateson points out, aesthetic unity is analogue to the "notions of systemic integration and holistic perception" [16]. Successful artistic pieces have a complexity of inner relations of similar or different shapes, colors, or notes. Either deliberately or accidentally, all elements are positioned to produce a certain meaning. Each element in art may have particular meanings, yet it contributes to the bigger whole which is larger than the sum of each part, as we can easily see in Klee's or Kandinsky's works.

Mary Catherine Bateson asks Gregory Bateson: "Daddy, can a scientist be wise?" [17] Scientists who do not reduce flexibility while pursuing rigidity can be wise. Blindly pursuing knowledge without noticing the value of love, the joy of dancing, and the rhythm of falling rain is not only blind but also dangerous. As David Lipset points out, cybernetics has the intellectual legacy of "at once uniquely flexible and ominously rigid" [18]. Cyberneticians know the integrated fabric of mental processes which surrounds us. A meaningful pattern is frequently co-created, and these mutual selves are dancers in the cybernetic field, as Gregory Bateson and Mary Catherine Bateson have demonstrated. The end of the dialogue concerning the question, 'what's a meta for' is William Blake's poem, the passage that a second order cybernetician pursued.

May God keep  
From Single vision & Newton's sleep! [19]

Strictly speaking, it is not Newton but Newtonians that are

trapped by a single vision in perfectly predictable order. In fact, Newton's vision has a tension between rigid order of the material movement in physics and the imperfect and fallen yet emerging condition of human beings in theology. Newtonianism is an ideological project which confines human beings in a closed, ready-made system, which blocks the dance with the other as a subject to observe. This Newtonian notion of order reached its pinnacle in Laplace, whose system self-organization of the emergence of novelty is not allowed. Undeniably cyberneticians dream of "dances with wolves," and to fully restore complex relations of beings destroyed by disciplinary rigor. Interdisciplinary rigor, to the contrary, attempts to build a complex system of relations against an exclusionary reductionism. At this emergent point, physics, biology, literature, design, and even holy religion converge with an "aesthetics of cosmic interactions" [20].

To see the World in a Grain of Sand,  
And a Heaven in a Wild Flower,  
Hold Infinity in the palm of your hand,  
And Eternity in an hour.

A mature cybernetician has the wisdom and grace of noticing the whole from a part like a poet. As Bateson notices, every single detail of the universe participates in these cosmic interactions, which is fully realized in Blake's "Auguries of Innocence." When the interaction or dance with the other is made on a global scale, it becomes a cosmic dance. This cosmic dance produces beauty in a more inclusive system. Yet this cosmic dance is different from the predicted and prearranged position of participants in the Elizabethan worldview. This new aesthetics supported by second order cybernetics refuses Newtonian massive reductionism and values the imagination and increasing aesthetic sensibility for this cosmic dance.

## 6. BOHEMIAN RHAPSODIES

Mythology can be another source to find cybernetic principles, patterns, and insights in relation to its aesthetics. Mythology is a foundation of all styles of human and non-human organisms, past, present, and future. Through imaginative projection, mythic characters have latent powers to open a new space, though they are shaped by what happened in the past. As in music, rhythm of recurrence is found in poetic mythology, whether they are metrical, semantic, or associative. "What has been said in the past" [21] is recasted and it is recreated in the present and for the future. In constructive principle, universe shows the interrelatedness of all parts.

Myth is another structure cybernetics is founded upon.

Nietzsche found "the discipline of aesthetics" [22] from two deities in the Greek myth, Apollo and Dionysus. Nietzsche attempted to restore the power of myth and tragedy which has been destroyed by logical formalism. Seemingly antagonistic two forces are in a complementary position, making a balance in Greek tragedy.

Dionysian madness is neither the sign of degeneration nor the symptom of decline. It is the token of overflowing health, abundance and richness. It is noteworthy that the decline of Greek chorus is ascribed to the annihilation of the chorus according to Nietzsche [23]. Music and rhythmic movement of dance that represent the Dionysian has been eradicated by rationalism. This eradication results in the destruction of healthy harmony between the Apollonian and the Dionysian and is the sign of decline, exhaustion, and ailing health of contemporary culture. To realize the artistic achievement of Greek tragedy, the spirit of music was necessary, and Dionysian music needs to be restored to revitalize contemporary culture.

Aristotle's conception of melos(melodie) adopting here. [24] In music, the inner grace of life is carried through rhythm and proportion. Its form is shaped of itself rather than being shaped by externally. Its verbal and non-verbal structure is autonomous, for it is associated with mythical pattern and associated with human experience. Greek tragedy fully displays Aristotelian ethics, for it does not simply represent the world of taste but also the integrated world of pure intellect, beauty, and the moral sense. As Northrop Frye points out, art can be regarded as a trinity containing scientific truth, historic law, and emotional beauty [25]. Greek tragic mythology extends our horizons vertically as well as horizontally. At the center of Greek myth are Gods, and a part of them is associated with personality and the other part is linked to the nature. It grows out of a cultural heritage of shared vision and values. Some myths have latent powers, "imaginative projections of life that humanity at present can see no use for, and yet are the sources of all the styles of living, past, present, and future" [26].

The discipline of aesthetics that Nietzsche has discovered is aligned with LIII proposed by Gregory Bateson. Bateson defined LIII as learning in the context of context, which facilitates continual deutro-learning. As the tools of change for the LIII, he suggested several employment including accepting contradictions, learning the context of contexts of LI, and letting go of one's self. Bateson refers to William Blake's "without contraries is no progression." [27] Blake's poem displays ontological ground for continual chain of feedback loops.

Will McWhinney added one more tools of change for the LIII. It is imaging by using dreams, drawings, and autobiographies to break the constraints of established grammar and vocabulary. [28] His proposal extends the

lists of a number of tools for LIII change. Yet he ignores the function of metaphorical language and mythological deliberations that lead the tolerance of uncertainty for the higher beauty in a larger inclusive system. According to Frye, the spacial gap between A and B is eliminated through metaphor, while timely gap is annihilated by myth [29]. Any text has structures to produce narrative movement, whether it is imaginary or not. The first structure is about metaphor of hearing and seeing. The second stage starts when a structure enters criticism. In this stage, a metaphor is frequently issued from stationary or visual art, particularly architecture [30]. According to Frye, metaphor blurs the clear distinction between subject and objects, and in metaphor past and future are fused. Myth and metaphor is not simply universal language for art but also the universal language of the second order cybernetics. In this context, Mary Catherine Bateson's book, *Our Own Metaphor*, is a universal personal account both on science and on art. Her visionary inspiration can be found in bohemian rhapsodies. "Anyway the wind blows" with rhythms and lyrics, breaking away random rhyming nonsense.

## 6. CONCLUSION

Considering the whole history of cybernetics, it starts with a device of technique, or a way of steering physical objects. It requires rigidity to properly measure the direction of the objects including ship, missiles, or robots. Yet as steering has expanded its scope from ships to the stars, dolphins, and human organizations, imagination as well as rigidity is required. A scientist who does not know love and wisdom never enters the extended field of cybernetics. Historically, bringing a creative, epistemic practices with aesthetics contributes to the field's further development, as Heinz von Foerster, Gregory Bateson, Margaret Mead and other cyberneticians have developed it to a highly complex integrative theory. With the advance of the second order cybernetics, art significantly contributes to its development by suggesting an integrated vision which goes beyond the boundary of a technical control theory.

Art in cybernetics emerges particularly where integration is necessary. Pointing out the integrative function of art, Bradford P. Keeney argues that "art emerges when head and heart becomes a part of a cybernetic system" [31]. As Nietzsche insisted, the beauty of art requires both Dionysus' madness and Apollo's control. In a higher contextual level, head and heart are required to work together in order to achieve an epistemological conversion. The emergence of art frequently restores destroyed ecological balance. Art can correct a too purposive view of life, and thus it can be regarded as a cybernetic cure. Art

combines multiple layers of minds such as unconscious mind, conscious mind, and external mind. Art relates these diverse orders of mind and thus cure lopsided conscious. With craft, an artist repairs broken pieces of a work. In this context, an artist is a therapist and a cybernetician.

This therapeutic value of cybernetics is related to the creative constraints of art. Like art, imposing too much restraints inhibits improvised creativity in any cybernetic practice. However, creative action without any restraint is both impossible and meaningless, for there is no such thing as a completely new thing without any precedence. In many cases, creation is the consequence of combination or reorganization of previously existing elements. In this context, the balance between restraint and creativity, or rigidity and imagination is crucial.

Producing novelty itself generates excitement and delight. In addition, science with aesthetics offers the highest delight in learning, generating wonder and pleasure by connecting different beings and uniting them into harmony in a graceful way. Like dancing and pop music, adding joyous frivolity to the serious exploration of the truth is another cybernetic value of art.

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