

Biological Agency in Art

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ABSTRACT

This paper will discuss how the pictorial dilemma guided traditional art towards formalism and again guides new media art away from the screen and towards the generation of physical, phenomenologically based and often biotechnological artistic systems. This takes art into experiential territories, as it is no longer an illusory representation of an idea but an actual instantiation of its beauty and significance. Thus the process of making art is reinstated as a marker to physically manifest and accentuate an experience that takes the perceivers to their own edges so as to see themselves as open systems within a vast and interweaving non-linear network.

Keywords

Agency, Semiotics, Biology, Technology, Emulation, Behavioral, Emergent, Earth Art, Systems Art, Bio-Tech Art

1. INTRODUCTION

“The artist is a positive force in perceiving how technology can be translated to new environments to serve needs and provide variety and enrichment of life.” Billy Klüver, *Pavilion* ([13] p x).

“Art is not a mirror held up to reality, but a hammer with which to shape it.” Bertolt Brecht [2]

When looking at the history of art through the lens of a new media artist engaged in several disciplines that interlace fields as varying as biology, algorithmic programming and signal processing, a fairly recent paradigm for art emerges that takes artistic practice away from depiction and towards a more systems based and biologically driven approach. This paradigm emphasizes the representational limits inherent at times in traditional art and evokes an agenda that desires to present us with concrete experiences within our conformation that are otherwise outside of operational awareness, thereby expanding our own boundaries and modalities. This paper steps through a series of shifts in my practice, relates them to previously occurring historical threads, and then discusses the method and medium where my practice is now fully engaged. This transition is from pictorial representation to screen-based behavioral simulations and currently to biotechnological art forms.

An artistic model based on general systems theory and networked media is an important impetus for this trajectory. A popularised medium of systems art can be seen in the

non-linear network that emerged at the end of the twentieth-century in new media art. This was the advent of screen-based art; whether taking the form of Internet art, virtual reality, or simulations based modelling etc., these systems were often concerned with developing non-linear representations of reality. However this format was not without implicit edges due to the nature of the screen and the limitations of computing; it also presenting finite possibilities and resolution constraints. This disappointment gives rise to boundary pushing. That in conjunction to an increasing technological accessibility, the possibility for artists to begin engaging with natural and mechanical materials within a system-based paradigm was presented.

Throughout modern art's history, painters and sculptors had time and again uncovered disenchantment with depiction and tried to outflank this history by breaking into uncovered territories. We can see evidence of artists trying to generate experiences and systems with agency, rather than objects and images, as a way of avoiding the representational pitfalls of depiction. Jack Burnham's writings in *Beyond Modern Sculpture* [7] very clearly demarcate this transition from object to system. What this paper is proposing is to actively take the positives of simulative art and its creation of a non-linear, interactive and engaging environment, but remove the limitations of representational depiction so often found in simulation-based work. Thus generating the emergence of an artwork that is occupying a place in reality just as we do. The art owns a communication system that allows transactional and transcendent sign processing to occur between the art and us.

2. ART HISTORICAL UNDERPINNINGS

“...Man is forever condemned to signification, unable to flee the “prison-house of language,” to use Fredric Jameson's formulation.” ([15] p 33).

The past centennial of visual art is marked by examples of artists trying to move away from depiction's dilemmas. In my own fledgling beginnings as a visual artist I often relied on symbolic imagery to open dialogs with the viewer, make unusual connections, map out natural and social patterns, tell stories and the like. Functioning as a visual language, these images and installed projections were striving to create a work of art that was more than just aesthetically pleasing but could also communicate an idea: a way of viewing reality, a sublime reverie or a transcendent vision.

When exploring the history of visual art we see similar happenings. Metaphorical and hierarchical scaling in the Middle Ages, depictions of sublime vistas during the Romantic Period, exquisite corpses of the Surrealists, the list continues. However amidst all of this great history of visual representations of ideologies and visions, there is a retrospective trend in the 20th Century and through to recent history to break out of this trajectory and give way to embodied representations, that are more relationally present than vernacularly styled images. What I describe is not necessarily the outcome of the work, but I posit, in reference to my own examination of this history as a practicing artist and also with the backings of other artists and theorists, that this could perhaps be an outstanding motivation for such a shift.

Minimalism is a prominent example of an art movement attempting to do away with depiction and unnecessary elements and stick to the essentials or formal traits of the materials that create the art object itself. Examples of this trajectory can be seen in the paintings of Frank Stella created in the late 1950s. As quoted by Marilyn Stokstad in reference to Stella's work "*Die Fahne Hoch.*" (1959),

"'Depicted shape,' the artist claimed was logically determined by the 'literal shape' of the canvas support. Even the 3-inch widths of the stripes were determined by the physical object: The canvas stretchers are 3 inches deep. What Stella achieved was a group of artworks whose features refer not to the artist or the outside world but to the physical aspects of the art object itself." ([28] p 1132).

Donald Judd, a sculptor of the same period rejects Stella's paintings as being pure form but rather as illusory representation of shape. His work uses actual physically instantiated rectangular forms, believing a sculpture to be more real than a painting [28]. Thus emphasizing into the medium of sculpture a formalist vision.

This movement can be recognized as a shift in representation towards a closer manifestation of what the work of art literally is in itself, as opposed to what it is communicating figuratively. The theory of formalism is as an intellectually stimulating shift and a prominent part of this theoretical thread foremost for the strategy it developed in making an artwork that is self-reflexive and autonomous. A possibility being that the thing itself -- the work of art, need not be made of traditional materials, which perhaps lend themselves to and were initially designed for the purpose of depiction.

2.1 Assemblage and Systems Art

In looking at 3-dimensional assemblage such as Man Ray's "*Object to be Destroyed*" (1923) and several other works assembled from manufactured or machine parts around this time, we see more ways of the medium being an essential factor in defining the work of art. The medium became a tool for engaging directly with the culture in which these

parts assembled came from and reference. As stated by Barbara Zabel,

"As a construction – an art assembled from parts – collage can be said to encode machine technology" ([36] p xiii).

Some notable works did manage to come extremely close to an autonomous embodiment, and in many ways such works centered on creating a story or dramatic experience that the 'viewer' actually took part in. The story was embodied in the work's formal existence and therefore existed in part in the same reality as we do and thus made possible a dialog or interchange to occur between the human being and the work itself. The poetry was actually embedded in the physical instantiation and behavioral manifestation of the work, and is completed by its existential presence in our reality. The story is lived, and the poetry is material. The outcome and description of the work is continually changing and engaging depending on external circumstances and the internal logic of the system's response to those circumstances.

A favorite example of this indication in a work is Tinguely's "*Homage to New York*", (1960). Tinguely was a part of a group of artists from Paris known as the "Nouveau Réalistes" (New Realists). Tinguely had managed to amass an outdoor kinetic sculpture for the Museum of Modern Art in New York, consisting of haphazardly assembled mechanical and industrial materials like motors and baby carriages as well as entropic chemicals all poised to self-destruct as soon as the work was powered on [28]. This action of self-destruction and the embodiment of entropy is a useful example of an emerging phenomenon in art: the attempt to make works of arts that carry a physical or biological agency or have some specific action or behavior that animates them and guides their existence within the human frame of reference. Another quality of such assembled works is the idea that the work is made of a sum of parts and only when all the parts come together does the work become whole, and transcend to create an artistic and poetic experience. Tinguely's "*Homage to New York*" may have contained unessential, latent or loose elements within the parts that made it up, however, it is an assortment of pieces that happened upon a one-way behavior of destruction. To the spectator, the self-destructing evidential behavior of the work, which happened as a very real event, came across loud and clear. The work even evoked a team of civil fire-fighters to come and put the fire out, which its existence and pursuit of destruction had managed to ignite.

This idea of a work of art that is an existing physical system resonated with many artists in the 1960s and 70s. Rising alongside the systems art shift was also a move towards interdisciplinary practice in the arts. Art had begun to not only appropriate objects of industry as part of their material creations but also began working directly with engineers and architects to create these technological works of art. A trope of this type of collaboration is "E.A.T" or Experiments in Art and Technology. This non-profit organization was founded in 1966 by engineers Billy Klüver and Fred Waldhauer and artists Robert Rauschenberg and Robert

Whitman [20]. Two prominent shows of their history included 9 evenings at the Armory in New York in 1966 and the Pepsi-Pavilion Expo '70 in Osaka. Jack Burnham's curatorial work "Software" at the Jewish Museum in 1970 is another relevant example of artists mixing with engineers. It is likely these collaborations are the instigations of the use of functioning, integrated and organized technology in art so as to generate not only formally grounded representations but also exploratory real-time behavioral representations. It also links object and system and re-imagines the audience as more than simply a spectator but as an actively engaged participant. To quote Jack Burnham,

"All of these interests [referring to the movement away from art objects] deal with art which is transactional; they deal with the underlying structures of communication or energy exchange instead of abstract appearances." ([6] p 10).

In the same citation Burnham later states: "Our bodies are hardware, our behavior software"([6] p 11). Returning to the original theme on the shift from the vernacularly based towards the formal, and then a stray within the formalist structure towards content; the "system" or mingling of hardware and software/body and behavior, becomes a way for the work to communicate with the world it resides within thereby giving us a tangibly grounded reference point without having to rely on depiction and illusory imagery. The work has a motivated and self-referential form and structure, but also a behavior or logic system that guides its animation and existence in time and space.

2.2 Smithson's Dialog

"That's a work [Spiral Jetty] that's very much involved with the processes of nature insofar as it goes through all different kinds of climates, dates, and seasonal states. It's involved with a kind of ongoing process. It's very much *in* the actual landscape. Well, getting back to Duchamp again, he's involved more with the notion of manufacture of objects so that he can have his valise full of souvenirs. I'm not really interested in that kind of model-making – the reiteration of readymades." Smithson ([31] p 86)

In an interview by Moira Roth with Smithson on Duchamp in 1973, he discusses a clear difference between his work and the work of Duchamp. He refers to the work of Duchamp as being "mechanistic" and "Cartesian"[31]. He emphasizes that Duchamp seems to be focusing on the spirituality of manufactured objects, whereas Smithson is keenly grounded in the changeable aesthetics of nature, and he makes work that comes in contact with the same forces of nature as our reality. He emphasizes the effects of time on his art, and when he critiques Duchamp's "valise full of souvenirs" he is pointing to a contrast in its long-term vitality. His work portends a time scalar, it will undoubtedly manage to outlive the manufactured object, as his art is open to change and the "ongoing process" of time. Smithson claims his work to be dialectical, and in many

ways it becomes clear that in works like "*Spiral Jetty*" (1970), he is engaging in a dialog with the Cartesian view of reality. So as to say that the manufactured and man-made evidence is no more to be exalted than the entropic qualities of natural materials. By creating this dialog, a transfer of meaning occurs between the industrial object and nature. In this action, Smithson is leveling the value field in assembled art between the manufactured and the natural and blurring some distinctions between the two. Additionally he is invigorating a sense of wonder of nature and man's operation of it. Thereby positioning itself in contrast to the contrived framing of the manufactured object, which to an extent created a false depiction of it, as was common of the work of many artists near his time period. Smithson was claiming nature to be all pervading, while simultaneously arranging, manipulating and making art with its substances and properties. In a sense he is opening up collage to include the usurping of nature and the environment as well. Though here it is only in early stages, this references the process of the use of nature and biology as agency within a work of art. Although Smithson's work is essentially a point of contact rather than a system for discovering thorough and shared communication, it does point towards an artwork that is in a dialog with time and to an extent the physical properties of the natural elements it is actively incorporating. It is an important paradigm to the work that I pursue, and can be seen as an extension of Assemblage, a common element in Systems Art and Conceptual Art, an essential motivator of Earth Art, as well as a common property of an emerging area known as Emulation Art.

2.3 The Screen

In many ways a data driven computer screen or projected moving image is more often associated with "new media art" than most other technologically engaged mediums. The screen seems to have become a definitive scaffolding to aid artists in presenting their ideas. Though the screen is used in many varying ways, the focus here will be on screen-based simulations or data visualizations, specifically graphical programming.

The desire to unravel the formulas of nature by modeling reality connects simulative spaces with the physical world. From the perspective of my own artistic trajectory, the programming of behaviors onto graphical representations of objects, forms or computer rendered organisms, creates a clear step towards the current direction in my work. One example being sound waves causing pixel based computer-driven wallpaper to ripple in a sine wave ("*that's nice*" (2002)). The attempt was to use computational technology to manifest or make visible seemingly "unknown" aspects of our universe, by using actual existing forces of nature that lay just outside of our operational awareness to guide the animation. Thinking of the celebrated "*Milkdrop Coronet*" (1957) of Edgerton and the influential action sequences of Muybridge, this artistic research shares a commonality; all interested in the pursuit of developing a scientific or technological apparatus for uncovering reality that was otherwise indiscernible by our physiology. In my

work, the graphics served the purpose of embodying the agency, behaviors or operations of these invisible or underlying properties. The presence of a virtual environment allows us to reexamine the reality of our current environment, thus invigorating new media towards a domain that picks up on the formalist sensibilities so well laid out by art historians and theorists in the past.

To see new media as a display technology for example, would only reinstate the pictorial dilemma, as artists would then be dealing with a predetermined system with which they are creating content for, thereby creating a less satisfactory artistic result. Simon Penny elucidates the importance of the connection between formalism and digital media in an article titled “*Systems Aesthetics and Cyborg Art: The Legacy of Jack Burnham*”,

“Many of the experiments in digital media are formal explorations in which the manipulation of media components are the work. In a manner analogous to minimal sculpture, the modalities of the technology become [7] not a vehicle but a substance to be modelled, manipulated and juxtaposed with the viewer in various ways. And if the technological combination is the work, then its ability to carry narrative “content” is a secondary issue and somewhat superfluous.” [24]

2.4 Away from the Screen

“The paradigm shift that emulation art suggests is the inevitable result of hybrid art research praxis at the intersection of scientific discovery, informatics and aesthetics, as we seek to understand the universe as an operating system in which we perpetually engage on both a microcosmic and macrocosmic level.” [4]

This quotation comes from a formative paper written by Shawn Brixey and James Coupe. This paper addresses the shift away from simulation and towards emulation. As stated in the quotation above, the work is not residing and operating on the confines of the computer’s operating system but rather viewing the work as running on the operating system of the Universe itself. Thus enabling the artist to push the limits of their own work to reference points outside of animated depictions coming from a computer screen and towards an experience of “fully inhabit[ing] the vast continuum which humans have inherited”[4].

This theory is perhaps the most adequate realization for the trajectory I described earlier, and the type of work I have been developing in recent years. These ideas have been given the name of “Emulation Art” by Shawn Brixey, the co-founder of DXARTS (the Center for Digital Arts and Experimental Media at the University of Washington, USA), the program where I am currently (2007) working to attain a Ph.D. The commonalities resonating with my own directives as an artist reside in the communication of an invisible reality outside of our operational awareness, yet

still fully embedded with motivation within the reality we inhabit. And in my recent work, the communion is seen in the use of biological and physical knowledge to generate these directed relationships through artistic experiences. As much of the rest of this paper founds on this principle I will segue into the next portion of the paper, which focuses specifically on the signification and aesthetic language of biology, its motivations, and the use of engineered information and artificially intelligent systems to embed knowledge. Succinctly phrased, “...the transfer and adoption of coded information between living and non-living things”. This definition comes from the word “metagenics”, first coined by Shawn Brixey in relation to his emulative practice, specifically the work “*Alchymeia*” (1998), in which human hormones are used to alter the growth of ice crystals, thereby creating a new entity through a synthetic intervention [5].

3. BIOSEMIOTICS

“In a way, the embryo is just a microcosm of the cognitive world that we inhabit, the world of signals that insistently urge us to travel to one destination rather than another, eschew some goals in favor of others, hold some things to be true and others false; in short, that moulds us into what we are.” ([22] p 42)

Biosemiotics is the study of biology from the perspective of semiotics. Semiotics is the study of signs, being understood as “essentially all of the ways in which information can be processed into a codified format and communicated as a message”[33]. Here I prefer to consider the word “information” to include intuitive, spiritual, and emotional knowledge, despite that in our recent colloquial definition of the word this seems to have been lost in favour to more mechanistic inclinations. However that is not to say that a mechanistic viewpoint could not be expanded or altered to include the increasingly codified understanding of such vitalistic forces. Experimental art could be considered seeking to connect gaps and disparities just like those, thereby giving way for new perspectives to occur. Thus, much of the next section is pointing towards and relating directly back to the interconnecting discipline of systems theory being used as a guide for contemporary artistic creation, and thereby building and creating relationships that impact our knowledge of ourselves and our umwelts.

Umwelt was coined and defined by Jakob. V. Uexküll, a founder of biosemiotics and theoretical biology, to be an “appearance world”([32] p 70) or a “subjective universe”[34]. Or more verbosely defined as: “biological foundations that lie at the very epicenter of the study of both communication and signification in the human [and non-human] animal”[11]. Biosemiotics is a hybrid discipline, integrating both the theoretical and the empirical. The physical characteristics of the biological organism are said to be the grounding factor in the formation and expression of the agenda of the being. The limits or the boundary conditions of the organism compose

the initial founding rules or the internal logic guiding the system's existence. Through this perspective our bodies are not only instruments, but open systems as well. Open systems can be understood as holistic or autonomous systems that are open to change of boundary conditions through the organisms own awareness of its subjective universe. Tangentially one might imagine each being to be considered the nucleus of one's own environment, and only when we unlock the potential of what we have inherited can we begin to incorporate and function operationally in spaces we have in the past felt incapable of entering. I prefer to include such language in this paper because it aptly suits a resonating philosophical perspective that guides my artistic process. Additionally, such philosophies could potentially unite the literal with the metaphorical and break down dualistic separations between the mechanistic and the vitalistic, the vernacular and the formal.

3.1 Assembling the Organic with the Inorganic

“In his *Novum organum* of 1620 Bacon begins by classifying natural history: that which ‘deals either with the *Freedom* of nature or with the *Errors* of nature or with the *Bonds* of nature; so that a good division we might make would be a history of *Births*, a history of *Prodigious Births*, and a history of the *Arts*; the last of which we have also often called the *Mechanical* and the *Experimental Art*’. In other words, natural history can be divided into the study of normal nature, aberrant nature, and nature manipulated by man.” ([22] p 10)

The first two statements in Bacon's quotation correspond well with the idea of the study of natural history being grounded in fortuitous and unplanned or accidental creations of forms -- specifically organisms, and thus only through the lengthy process of natural selection do we have the organisms that exist in our current realities. However the third element in Bacon's hypothesis seems the most intriguing, implying a potentially teleological approach to the creation of nature, brought on by the organization of “man”. More specifically he equates “*Mechanical* and *Experimental Art*” with this particular approach.

Not surprisingly there are already vast numbers of works of art dealing with biological agency altered by the hand of the human, as well as art where biological systems are communicating with machine and information technologies. The poetic metaphors found in the expression of biological behaviors provide fertile ground for artistic pursuits. One example of an early attempt at the metaphorical relationships found in biology is Hans Haacke's “*Chickens Hatching*” (1969).

“Here, freshly laid chicken eggs were collected from a brooder, transferred to an adjacent hatchery and distributed among a grid of eight small incubators. The hatching process was controlled artificially, via

a simple feedback system of lamps and thermostat.” [27]

He is assembling machine technology, data processing and biological phenomena, aesthetically, and then presenting it in an artistic space as a way of exalting such a synthesis between machine and birth. Another example of machine and computer technology being used with biological agency in an artwork comes from the “Software” show of 1970, curated by systems art theorist Jack Burnham. In the catalog for the exhibition this work is referred to as “Life in a Computerized Environment”, and titled “*Seek*” (1969-70)[6]. The Architecture Machine Group of M.I.T. while under direction of Nicholas Negroponte and Leon B. Groisser created this project, which was very aptly recognized by Edward Shanken, as being “an early example of ‘intelligent architecture,’ a growing concern of the design community internationally.”[26]. In “*Seek*”, gerbils are placed inside of a 5' x 8' glass box with several cubes or blocks that make up the gerbils' environment. There is a computer driven mechanical arm that has a mental map or visualization of the set-up of the blocks, and it goes about making sure the blocks remain in the position of their origin. It is unknown to the mechanical system that the gerbils are knocking over and shifting these blocks, and so the machine is in a continuous feedback loop with the gerbils replacing and reacting to these alterations in its mental understanding of the space it is monitoring. The designers of the project state,

“Today machines are poor at handling sudden changes in context or environment. This lack of adaptability is the problem *Seek* confronts in diminutive.” ([6] p 23)

If we take the notion that adaptability and entropy are essentially physical and natural qualities of which the machine has little exposure or inherited understanding of, such early systems are “metagenic” in their desire to transfer information from the living to the non-living, although in this system it is unclear whether or not this information is actually being remembered and learned by the system. Regardless, the presentation of gerbils knocking over blocks in this computer-monitored environment is an elegant framing of natural drives. Similarly it reminds me of the framing of “unconscious drives” that Smithson finds in his photographic slide work “*Hotel Palenque*” (1969)[10]. Though Smithson is not transferring information to a non-living system, he is analyzing and exalting an unconscious and entropic facility of the human being that lies in contrast to our drive for teleological creation. In this case, found in the unfinished construction of a hotel in Mexico, which leaves behind material evidence of the unconscious drives of the builders themselves.

A prominent artist deeply involved in the codification of biological messages in pursuit of a creation of relationships or dialogs between technology and biology is Eduardo Kac. I often place his work in a realm of “Conceptual Art” as his art is not often about the explicit aesthetic presentation which we are witnessing, but rather

the immaterial networks and dialogs that occur when assembling his various symbols into a cohesive idea, an intellectual puzzle at times – and in part an extension of Marcel Duchamp's readymades. One example of this is "Move 36" (2002) in which he plots a plant's DNA sequence that can be mapped out to contain the words "Cogito Ergo Sum". This plant is then placed on the location on a chessboard where the first computer beat a human in the strategic game of chess. The transfer of the information "I think therefore I am" has no impact on the knowledge system of the plant itself, it can never be decoded by the organism, although the encoding of the DNA changes its physical form, rendering its leaves slightly curled [18]. The assembling of the plant on the chessboard is another conceptual arrangement, all of these pieces existing to prod us to think philosophically and critically about cybernetics and its implications for Dualism, essentially making the work primarily conversational in its agenda. Similarly, works like "GFP Bunny" (2000), his highly influential transgenic bunny, embedded with glow-in-the-dark DNA, usually used in the scientific community for gene marking, shows yet another immaterial relationship existing to ignite conversation rather than to poetically embed human beauty intentionally into nature. The work is most strongly engaged with an invisible social and cultural network, as it intrigued mass media to question this action, whether we ever actually verifiably saw the bunny glowing or not. Kac's earlier bio-technological works deal with attempting intercommunication between species, where the art seems to lie in the relationships between entities that otherwise would or could not exist if it were not for the mediation of technology.

All of these examples of the formal assembling of organic and inorganic materials into systems of sign exchange point to a common relationship developing. This relationship has components of biological phenomena, technological communication systems, and the human being who creates, witnesses and utilizes the experience. The emphasis often lies in the non-linear network that exists between the two entities, and the transactions that occur amongst them. Thereby enabling the human being to enter into dialogs that we were previously incapable of accessing, as well as impact areas of our development that were otherwise outside of our operational awareness. This could potentially emphasize a communication system that is not reliant on words, but rather on behavioral, physical and material properties and the evidence they leave behind for us to witness and understand. To conclude on this section, in 1926 Jakob V. Uexküll stated in his book *Theoretical Biology*, "If we succeed in getting an animal to produce a suitable sign-language by means of its organs, we can converse with it as with human beings" ([32] p 177). Such a proposition is not even remotely theoretical at this point in our culture, but it does elegantly put forth the solution to the boundaries of separateness and the translation of information between different species; in our culture we include synthetic and non-living systems within that scope.

3.2 The Arbitrary vs. The Motivated

Minimalist artist Robert Morris has often discussed the need for work that is motivated, which he describes as "the search for the motivated", and theorist Hal Foster puts forth the notion of the "arbitrary" in counteraction to this term [14]. From my perspective, motivation is analogous to the agenda or vitalistic drive of a system. Thus the distinction between the arbitrary and the motivated has a significance in the artistic decision making process. An arbitrary expression is usually the result of a message that was not properly received. Likely in such cases, a common language was not found, such as the arbitrary curling of the leaves in Kac's "Move 36". The plant is unable to interpret those words, and therefore could not meaningfully express such an intensely philosophical ideology. The artist's motivation was likely not to transfer usable information to the plant's genetics, however the reality stands that he was embedding human knowledge into a plant's DNA, thus opening up a possibility for imagining what motivated communication might make possible for our physical reality if the transfer of information did have a common sign processing system.

4. Current Explorations

The next section will detail my most recently completed work as well as describe some future avenues for artistic activity. An endogenous drive within an organic life is the binding commonality between the current work and future work I propose. It resonates clearly with the issues presented by Jack Burnham in *Beyond Modern Sculpture* [7], in his sections underlying the presence of vitalism and organicism within modern sculpture. The complexity of these concerns historically in scientific, philosophical and artistic realms precludes this paper from going into any significant detail on the matter. However it can be broken down simply to explain that vitalism implies an 'unknown' life force guiding and motivating an organism and organicism refers to optimally functioning organized systems. The concept of biological agency refers to its life force and similarly the manner in which it, as a system, is organized. By using this agency as guiding factors within specifically a mechanical and algorithmically based work of art, the connection discussed by Burnham between the mechanical-organic continues to develop.

4.1 The Search for Luminosity

"The Search for Luminosity" (2005-7), is a two-part project consisting of the same feedback system; the first system is counter balancing in behavior and the second is self-reinforcing. "The Search for Luminosity (part one)" is a short video composed of time-lapse footage taken over a span of about a week. In the system, a phototropic plant, *oxalis*, is triggering its over head light source to turn off as soon as the plant's leaves reach their position of fully awake, and then turning its light source on as soon as its leaves fully close. This is a counter-balancing loop, causing the organism to continually be either waking itself up or

putting itself to sleep, thereby altering its circadian rhythms and mutating its cycles to shorter and shorter length days and nights. While making this initial time-lapse video, at one point the mechatronic system failed to recognize when the plant fell asleep, and thus it kept its light off. In the process of this systemic glitch occurring, the plant acted independently of its light source and woke itself up regardless. In the last phase of the video we see this act occur, and it becomes the poetic grounding point for the next part of the project.

After doing some research into circadian rhythms, I found that many life forms contain endogenous rhythms, meaning here that it is not always the presence of a sun that triggers a plant to lift its leaves in preparation for photosynthesis, but rather a programmed memory of sorts that the plant has of its previous day's routine. It is an organized function of the system, and also a poetic example of life force and vitalism. Whether science can explain the happenings of this movement or not is not the point of the work, rather the fact remains that the plant does not need that initial sunlight every day to wake itself up and therefore it can be interpreted as an agenda of the organism to move its leaves in expectation of sun. Therefore, in the second iteration of the project, I decided to make the cycle self-reinforcing. In darkness, as soon as the sensor recognizes the plant has begun to lift its leaves, it provokes its above light to turn on, thereby putting the power of the sun rising in control of the movements of the plant. The plant's dramatic gesture of waking and sleeping becomes the signaling observed by the technology that mediates the message to the acting sun in the plant's universe. Another difference in "*The Search for Luminosity (part two)*" is the use of multiple plants. In this instantiation the final format for viewing is not a video but rather an autonomous biotechnological installation. By having multiple plants the need for time-lapse video is done away with, as the viewer instantly sees the plant in several periods of its cycle from fully awake to fully asleep. Lastly, this particular iteration contains a custom-built scanner that develops a visualization of the plant's form, thereby allowing the plant to grow and move within the scanner's field of view while still allowing the scanner to track its position. This information is then transmitted to a data projection [Fig.2] that provokes a sense of satellite imagery and creates a dramatic shifting of scale as we look on at these fragile plants now able to communicate across a vast landscape.



Figure 1. *The Search for Luminosity (part two)*
Photography by Neil Lukas, 2007

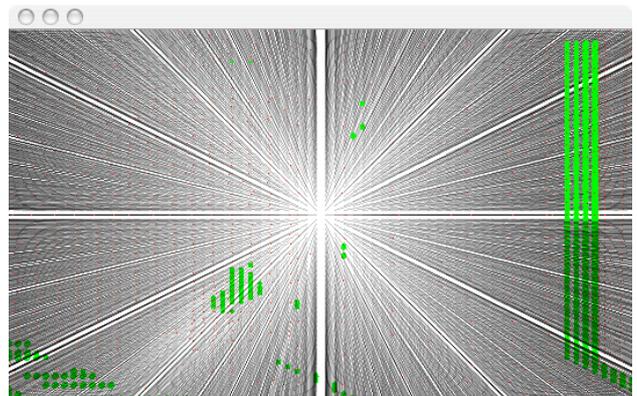


Figure 2. Still screenshot from data transmission in *The Search for Luminosity (part two)*

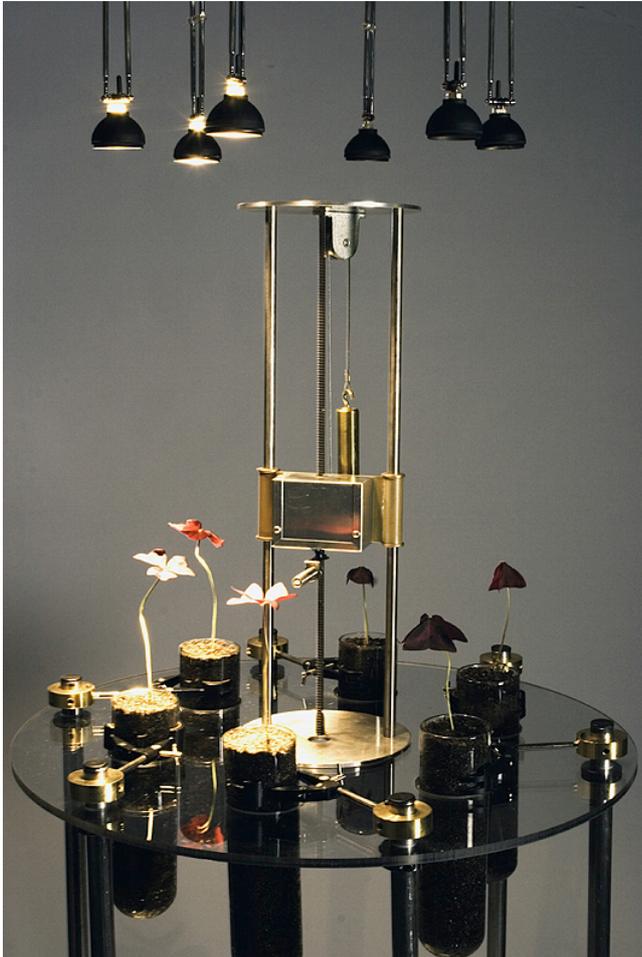


Figure 3. Detail of *The Search for Luminosity (part two)* Photography by Neil Lukas, 2007

The decisions made in the process of making this work were focused towards creating a visual and time based art experience that could show us a verifiable non-linear network outside of operational awareness that would directly affect us on an essentially existential level. Typically light patterns in scientific experiments are dictated in a predictive manner, with little concern for what the plant might want or “decide”. Therefore the notion that a plant might attempt to engage in communication with the sun in its environment via the movement of its leaves could be seen as a reverie or poetic meandering. The decision to build an (x, y, z) imaging system with an ultrasound sensor was to purposefully draw sharp analogies to the cognitive visual process that is simply unchallenged through a human scaled video camera. We watch the sensor scan and draw, attempting to make sense of the visual signal, whereas a camera would simply perch and reflect. When the sensor becomes active, the idea is to see it as being a part of the plant, connecting it to the sun and being animated and learning in a similar fashion to the natural subject; again creating philosophical resonance by transferring biological information to a non-living system. Over time the mechanism may begin to mutate its own movement cycles

of its motors as it links itself closer and closer to that which it is observing, aiding, and becoming. Rather than accepting the organism as a closed system, we discover a reality where with the aid of technology and the recognition of its own form and behavior, an organism might be able to expand its own boundary conditions and regenerate its physical expression.

This work of art is grounded in a common natural agenda in life: circadian rhythms, with the intent that the work of art could begin to emerge its own sculptural form and pattern. Here the attempt is to witness a new hybrid form with all of its own meaning and significance. The aim is to be able to connect with the organism, as it potentially allows us to see our system and network in a stripped down and decompressed version, re-examining the lenses we use to see ourselves, and who we become as a direct result of that ability to cognitively process and subsequently alter our environment. It is my desire to make art that is rather than alluding to an idea or reverie, an actual instantiation of that reverie. Here we can see how the plant through the mediation of a common signaling process may be able to locate itself and position its sunlight, and the resulting effect that has on its sculptural form and its patterns of waking and sleeping. Therefore the visual representation of the body of the plant will mutate once it is given this additional degree of control, thus allowing the inner complexity of the system as it learns more and more about itself to externalize itself by the way in which the form and behavior of the plant changes over time.

4.2 Future Endeavours

One area of continued fascination is the idea of building a living work of art that can emerge its own representation through the control of its growth and formation. The idea of an artwork having life force or motivation is of great significance to my own inquiries into artistic creation, and one way to go about generating such a system is by vitally embedding an organic system in the elements of the work. In doing this, I am attempting to develop open systems, and through these systems the formal structure and patterns of the work come into existence. In all works of art some premeditation is necessary, this is how we direct the experience and create the work. However, it is my desire that the manipulation of biological forms within a work be open, so as to increase degrees of freedom and expression as opposed to predetermine them. Potentially allowing a common sign language to emerge between the human and the biological phenomena, and allow that common agenda to dictate the receiver’s experience of the work. In following along these same objectives, I am working on growing undifferentiated plant tissue that is communicating with a technological information system that guides the development of the plants formal expression, resulting in a living sculpture that embodies the common language embedded between ourselves and it.

5. CONCLUSION

In conclusion, this paper has stepped through several points in artistic history in the effort of discovering a potential motivation behind a possible trend in the visual arts and in my own work as a practicing artist towards the creation of biotechnological, hybrid, and experiential art forms. If we see our physical realities as metaphors in themselves, then we no longer need to remove the metaphor again by placing it in a vernacularly styled symbolic depiction, representative of that metaphor. Rather we can engage directly with the materials of our physical existence, to create art works that share the same non-linear realities that we do, and are guided by similar forces that guide us. Thereby enabling an expansion in our own expression of our agenda within the universe in which we reside.

To this extent the future of new media art lies in the artist's ability to stake claims and inhabit areas of human development that in the past they have stayed removed from or only referenced through symbolic imagery and narrative depiction.

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