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### Cloud-watching robots: Douglas Bagnall's machine aesthetics

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## Cloud-watching robots: Douglas Bagnall's machine aesthetics

### Abstract

Can a robot waste a day away watching clouds? Aesthetics as a means to approach the world is a form of control until recently limited to humans. This essay uses two works by New Zealand artist Douglas Bagnall to examine the relationship between machines, information and aesthetics. I discuss how Bagnall's *Film-making Robot* (2004) and *Cloud Shape Classifier* (2006) are examples of aesthetic machines that, rather than being defined by information, repetition and the digital specificity of the pixel or the binary, are characterised by an aesthetic dynamism formed between emergence and mutability. Building on the recent identification of 'new aesthetics', I argue that processes of emergence and mutation contribute a new way to think about machines, information, humans and aesthetics. Finally, I suggest that Bagnall's works do not just demonstrate machinic vision but prefigure a move in contemporary art from the stable aesthetic object to the unstable and impure real-time process of machine aesthetics.

### Keywords

robots, bagnall, douglas, machine, cloud, aesthetics, watching

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# ***Cloud Watching Robots: Douglas Bagnall's machine aesthetics.***

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## **Biography**

Dr. Susan (Su) Ballard is an art writer and curator from Aotearoa New Zealand and senior lecturer in Art History, and Contemporary Art at the University of Wollongong, Australia. Su's research focuses on encounters between art history and new media in the art gallery with forays into systems, aesthetics, utopia, noise, machines, nature, accidents and errors in contemporary art. Su co-edited *The Aotearoa Digital Arts Reader* in 2008.

## **Abstract**

Can a robot waste a day away watching clouds? Aesthetics as a means to approach the world is a form of control until recently limited to humans. This essay uses two works by New Zealand artist Douglas Bagnall to examine the relationship between machines, information and aesthetics. In it I discuss how Bagnall's *Film-making Robot* (2004) and *Cloud Shape Classifier* (2006) are examples of aesthetic machines that, rather than being defined by information, repetition and the digital specificity of the pixel or the binary, are characterised by an aesthetic dynamism formed between mutation and emergence. Building on the recent identification of 'new aesthetics', I argue that processes of emergence and mutation contribute a new way to think about machines, information, humans and aesthetics. Finally, I suggest that Bagnall's works do not just demonstrate machinic vision but prefigure a move in contemporary art from the stable aesthetic object to the unstable and impure real-time process of machine aesthetics.

## **Keywords:**

aesthetics, new aesthetics, real-time, information, machine, emergence, mutability, digital.

## ***Cloud Watching Robots: Douglas Bagnall's machine aesthetics.***

Taste classifies, and it classifies the classifier.

PIERRE BOURDIEU – *Distinction* (1984)

When Alexander Gottlieb Baumgarten defined “sensuous materiality” (Pietz, 1996, p.197) as key to the domain of enlightened experience, humans found themselves at the centre of a self-contained aesthetic universe. Debates around the control of taste were focused by a narrow system of possibilities; art could either take viewers inside of themselves (beauty), or conversely allow them to move outside of their limited understanding of the world (sublime). How far one could travel in either direction was regarded as an indication of the refinement of one’s taste. This melodramatic oversimplification of eighteenth century aesthetics should not really have a place in an essay about robots, information, machines and looking, and yet its obvious constraints are perhaps the reason why this model of Western aesthetic thought persists. It has resulted in a definition of art that is either a universal position paradoxically only understood by a very few, or, part of closely held individual and personal affirmations. In the early twenty-first century the escape from these aesthetic hierarchies has not been straightforward. For example, French sociologist Pierre Bourdieu (1984) demonstrates that as soon as humans draw on a notion of beauty in order to get a sexually explicit film reclassified as an ‘art’ film, or when a photograph of a naked girl exhibited in a public art gallery is defended by curators and critics against popular outcry, we find ourselves reinforcing (once again) the connections between taste, knowledge, power and reason and their separation from everyday experience and understanding. These aesthetic practices remain engrained in contemporary thought and experience (Rancière 2006).

Aesthetics as a means to approach the world around us is a means of control apparently limited to human individuals. But recently writers have begun to ask: what if the individual looking at the art is not a human but a robot? Is there a 'new aesthetic' that is connected to digital materials and the way that machines look? Can a robot appreciate art, or sense pleasure? Can a robot waste a day away watching clouds?

In the late Eighteenth century it was the leisured classes who had time to watch clouds and hone their aesthetic judgements at public art galleries. Just a few years before Kant wrote "Observations on the Feeling of the Beautiful and Sublime" the Swiss watchmaker Pierre Jaquet-Droz had built a series of automaton. Jaquet-Droz's automata were magical figures that stood in for humans. Surviving today are a pianist and a writer; each automata is occupied by a skilled activity that mimics that undertaken by a knowledgeable and refined human individual, (neither of the automata have the time to look up from their labour and gaze at the clouds). The concept of a robot as a slave or servant did not emerge for a further 150 years. In 1920 Czech playwrights Josef and Karel Capek imagined a group of robots originally intended for servitude, who develop both desire and resistance and eventually rise up to destroy humanity. Early in Act 1 of *Rossum's Universal Robots* Helena Glory a representative of the Humanity League raises the possibility of robot aesthetics. She suggests that the Robots might receive wages in order to 'buy ... what they need ... what pleases them.' Helman the chief-psychologist for the Robots replies: 'That would be very nice, Miss Glory, only there's nothing that does please the Robots. Good heavens what are they to buy? ... They've no interest in anything, Miss Glory ... No passion. No soul.' (1961, p.22). Rossum's Robots are designed to take care of the drudgery of industrial life, enabling humans to live a life that is freer and in which 'Everybody will live only to perfect himself.' (1961, p.25).

The Capeks did not record robots looking at clouds or making artworks; these developments in machine aesthetics were left for later generations.

Recently, questions have been asked: what happens when machines make art (Dohm and Stahlhut, 2007)? Are we amidst a new aesthetic image revolution (Bridle, 2012; Goodbun, 2012)? What is it like to be a bonobo or a satellite or a pixel (Bogost, 2012)? If machines began making art in 2007, then in 2013 they seem to have shifted towards the generation of machine aesthetics via what has been termed the ‘new aesthetic’. The new aesthetic is more than a general cultural condition, but a combination of digital machines (as formed through properties, capacities and tendencies (DeLanda, 2011 p.5)) and humans who watch and experience these machines over time.

The emergent aesthetic relationship between human and machine is crucial for the discussion presented in this essay. Aesthetics remain a way to articulate human relationships with the world around us, and historically humans have created many machines to look at the environment on our behalf. These are traditional aesthetic machines; tools that assist humans in their pursuit of aesthetic pleasures. They are machines that are looked through rather than at. The new aesthetic implies that there is now a level of decision-making, if not consciousness to the machines as they look. The kinds of robot machines considered in this essay use learnt human aesthetics to apparently develop their own aesthetic sensibility. This is what I term machine aesthetics; a particular kind of aesthetics that is shared between human and machine. If these machines can overcome their obedience to informational structures and begin to independently consider their environment then we are experiencing a shift in the social

and power structures that have hitherto informed aesthetics. A newly mutated machine aesthetics leads to the suggestion that what has emerged in the twenty-first century is an aesthetics that is understood not just by humans, but by machines that look and are sensitive to this look.

The remainder of this essay will examine two networked digital installations by New Zealand artist Douglas Bagnall. First I will introduce each of the works and their operations. Bagnall's *Film-making Robot* (2004) and *Cloud Shape Classifier* (2006) demonstrate how a machine aesthetic forms, what it is, and where it might be located. These works produce encoded aesthetic experiences that re-distribute sensory power relations between human and non-human. They rely on the technologies of the digital but operate through the techniques of art's histories. In both works digital machines are guided towards independent aesthetic judgements and humans must share their knowledge, and thus the control, of aesthetic realms with them. Although they appear to operate at a distance to humans, they suggest a more complex and impure relationship where aesthetic understandings are shared, and emerge between human and machine. Bagnall employs an approach to digital art that (like the histories of information theory he draws on) insists on a playful commitment to intrusions, interference, and impurity. The works are fluid and unpredictable, but not accidental.

In discussion of these works I will contend that Bagnall has constructed a machine aesthetic that goes further than that suggested by the 'new aesthetic.' To do this I will trace a history of the relations between digital matter and information. Beginning with the definition of information by Claude Shannon in the 1940s I will end with the shifting definitions of emergence presented by Katherine Hayles and Manuel DeLanda

respectively. Drawing on echoes found within this pre-history I will show how Bagnall's works generate a machine aesthetics via continuous dynamism and emergence, what I will term 'mutability'. Finally in describing the mutability of these works I will show how new aesthetics do not just involve the recognition of machinic vision, but contribute a particular way to understand the movement that is occurring in contemporary art from stable aesthetic objects to unstable and impure real-time processes.

### ***The Film-making Robot***

Bagnall's *Film-making Robot* is not really a robot at all. Its eyes are part of a device that travels through Wellington, New Zealand's capital city, on public transport. It films what it sees and makes use of existing telecommunications networks to download and edit this footage into short films that reflect the particularities of the city. Wellington has a substantial free wireless network called caféNET. When passing by a wireless node the robot downloads its footage. At night the robot 'dreams', and in the process of dreaming edits together the recorded footage to make that day's film. Using its classical training in aesthetics the robot assesses each frame and compiles a final work (with credits) that is uploaded to the Internet. On his website Bagnall (2004) describes the work as follows:

This robot makes short films based on its visual experience. Its eyes travel about the city on buses while the body sits in a gallery. The eyes collect snippets of video, and transmit them to the body when their buses come within range of a Cafenet wireless Internet node.

(<http://www.cafenet.co.nz/zones/wellington/map/>). The robot body splits the video into individual frames and analyses each one, obtaining twenty numbers reflecting the arrangement of colour, shape and detail within the frame.

The process of filmmaking is distributed between the robot's eyes that travel the city and the robot's mind located on a networked server in a gallery. Gathered information travels



between robot eyes and mind through wireless networks. The network upon which the work is constructed (and that is created by the work's operations) is particular and local, dependant on bandwidth, the circulation of public transport, and the generation of shared viewing experiences. The network is essential to the storage, action, control, distribution, and creation of the work. The robot's films reflect something of this digital dependence. [1]

The films made by the *Film-making Robot* have a point of aesthetic finality or completion, as the robot creates films that fit its own studies in aesthetics and then shares them with a gallery audience as finished works. Each day as it travels city streets the robot records hours of footage. At night it translates this information into film. The robot 'dreams' its films, finding them printed and distributed as it wakes. As Bagnall says: 'I used to be a film maker, now I help robots to make films.' Bagnall (2004) integrates technical processes within the description of the robot itself. To make a film the *Film-making Robot*

splits the video into individual frames and analyses each one, obtaining twenty numbers reflecting the arrangement of colour, shape and detail within the frame. These numbers are treated as coordinates in a twenty dimensional space, in which distance is somewhat related to visual difference. For twelve hours a day the robot traces a zigzagging path through this space. This path passes through a series of images, which become a video sequence. ... At the end of the day the robot looks over its days work and joins the best parts together as a finished film.

The *Film-making Robot* does not demonstrate artificial intelligence, but machine learning. All its training is based on the nature of the human aesthetic experience, its technique born from repetition. In order to be able to translate and edit its images, the robot was trained using a narrow and particular selection of fine art images gathered from the web; with a majority being impressionist paintings from 'ibiblio' (<http://www.ibiblio.org/wm/paint/auth>) and some contemporary and New Zealand art. Because the robot can only think one frame at a time, the compositional forms it learns from are those of the still image – the painting – rather than

those of film. Secondly, a human trainer worked with the robot. Dividing the images produced by the robot into sets of ‘good, bad and neither,’ he trained the robot’s network to like the good ones and dislike the bad ones. Three further heuristics were then employed: ‘enthusiast’, the network was encouraged to start fresh each day and improve on past experience; ‘away from mean’, where the robot’s preference tended toward images on the edge of space; and, ‘away from recents’, resulting in the generation of a dislike for waypoints similar to ones recently used. These criteria constitute the robot’s ‘dreaming’. This process of working across and between different criteria whether within the individual frame or in the frame’s relation to other frames is comparable to the human process of editing film. Both machines and humans learn aesthetic criteria through repetition and experience. Bagnall (2004) describes the dreaming process:

Visitors to the gallery can see this video, called variously the robot's “dream” or “stream of consciousness”. ... The robot uses neural networks and heuristic rules to choose waypoints for its daily dream, but the finished film is mainly selected for the smoothness of its movement through the space. The robot will remember everything it sees until it has five million images in its mind, after which it will replace its least favourite images with new ones. In addition to getting images from the eyes, the robot creates false memories by combining and manipulating well-liked and overused images. These notes are incomplete.

Bagnall highlights the close relationship between processes of information transmission and aesthetics. Because only its eyes can move, the robot’s technique also shares much with Plato’s discussion in the *Republic* of prisoners who mistake the shadows on the cave wall in front of them as ‘real’. When finally released from the cave the prisoners are unable to equate what they see with anything they know or recognise. Film theorist Jean-Louis Baudry (1976) used Plato’s story to develop his model of the cinematic apparatus. Bagnall (2004) makes the filmic apparatus of the robot explicit: ‘the robot lives in a cave and only sees the shadows of images of the real world. The shadows look like numbers.’ At the end of each day, the *Film-*

*making Robot* employs a second set of criteria to compose the final film for screening in the gallery. This second application of criteria looks at the film from a meta-perspective, tending toward the creation of softness and steadiness of change in the film. Here the *Film-making Robot* takes on the role of director, or auteur, no longer simply editing but imposing an apparently subjective sense of flow, repetition and potential narrative to the work. In this integrated aesthetic body, the *Film-making Robot* fulfils one of cinema's utopian dreams, where the entire apparatus of filming and screening is incorporated within one auteur body (albeit distributed) (Vertov, 1984). In the process of film making the robot shifts its perception from a representational approach to the image to a compositional one. In representational mode the *Film-making Robot* looks at the surface of each frame and selects or rejects the frame for its validity within the aesthetic criteria it has learnt from humans. When it shifts into its compositional mode the *Film-making Robot* has the potential to introduce new contextual combinations of its own. The results of its aesthetic decisions are emergent, dynamic and unpredictable.

It is through the compositional tools of digital translation (turning numbers into images) that the robot is able make films. As a mechanical device that both receives information (like the human viewer in the art gallery, or in its case, on the streets of Wellington) and presents the information (the recording and creation of the films) the *Film-making Robot* seems to be able to inhabit multiple representational frameworks. This is the paradox of the *Film-making Robot*: is the robot really able to compose or does it merely represent and repeat? Is it enacting the properties of the digital, or does it extend its capacities into affective and material relationships? If time and space are materials for the generation of aesthetic experiences and if these materials are assessed by way of learnt aesthetic criteria; the robot would seem to do more than repeat its lessons. It is more than a performer trapped within

controlled representational structures. The robot stockpiles time and transmits image. In this it composes. The *Film-making Robot* makes films by engaging with the digital materials of pattern and repetition in order to generate works that human viewers experience aesthetically. As well as being an aesthetic machine, it is a machine for aesthetics. And as a machine for aesthetics the robot creates understandable and recognisable aesthetic objects for its human audience.

The robot makes films that humans can not. It has its own aesthetic that despite the predictability, repetition and specificity of its neural system, remains dynamic, mutable and emergent to the viewer. As a film-maker, the robot repetitively introduces and works with what appear to many human viewers to be noise and dissonance. Combinations from frame to frame appear random and narrative is subsumed by perplexing fragments of a journey cut together. This is because the robot's neural networks are discrete and thus unable to master a linear or continuous understanding of time. The compositional heuristics that control its aesthetic output result in frames appearing to jump and stutter as the narrative of the film progresses. To the computer this is not noise but 'good' filmmaking - it follows the rules. To human viewers the films glitch and move unpredictably between what seem to be fast-forward and rewind modes in a kind of kind of stop-start aesthetic, once thought to be lost with the demise of the VCR. The networked creation of the work, and the reception of it within the gallery distribute the social and cultural frameworks of representation beyond that expected in the substitution of a human for a machine. It introduces something new. The films created by the robot contain elements not predicted by Bagnall, and not necessarily expected by the properties of the system it enacts.

The *Film-making Robot* emphasises the multiple material tendencies that occur in the production of machine aesthetics. These tendencies include: the materiality of the digital itself – information, the materiality of meaning production – language, and, the materiality of aesthetic reception – culture. In order to function the *Film-making Robot* is completely dependant on the operations of information transmission; it must film, upload, download, compose and output using the digital languages and properties of information. The networks of information introduce a second layer to the work. Rather than creating or presenting discrete objects the *Film-making Robot* uses the tools of information transmission to establish aesthetic relationships between differing material bodies, images, representations, and spaces. As soon as the *Film-making Robot* goes out on the streets the presence of noise means that repetition is impossible, its information remains mutable. It makes films that are noisy, glitchy, and apparently full of error. The films themselves may be an output, but they are not the whole work.

### **The *Cloud Shape Classifier***

The second of Bagnall's works I discuss here does not have the same mobility as the *Film-making Robot*, but uses many of the same heuristics to question the specifics of human aesthetics. It does this by expanding the capacities of the digital to include networked human interactants. The *Cloud Shape Classifier* (2006) is a robot camera that looks out of a gallery window at the clouds in the sky. Every few seconds it takes a photograph that is uploaded to a networked database from which humans can choose and save their favourite cloud photograph into an online account (called a classifier). (Bagnall uses the terminology 'Cloud Shape Classifier' (large 'C') to discuss the work as a whole and 'classifier' (small 'c') to discuss the operations of the individual image groupings.) *Cloud Shape Classifier* is

distributed between a website, a mobile gallery location, and a fixed camera. The camera points out the window of Enjoy Gallery in Wellington, New Zealand. The gallery the work is exhibited in can be anywhere in the world (the installation includes a digital projection of the 'most liked clouds ever'), and the website allows human users to log in when ever they need from where ever they are. Ostensibly, the *Cloud Shape Classifier* is a tool for the overworked, perhaps directed at those who spend too much time looking at art rather than gazing at clouds. For some, checking for cloud updates can become as compulsive as checking Facebook updates.

This website can help you to find images of clouds you like. If you spend a short while teaching it, it will keep watch of the sky for you and show you good clouds you might otherwise miss. ...

*Cloud Shape Classifier* can be trained on your own, or collectively through the shared classifiers.

Within the gallery space, the machine will present clouds it knows are similar to those chosen as collective favourites, with the opportunity also for visitors to continue training the machine and refining the best cloud ever (Bagnall, 2006).

*Cloud Shape Classifier* differs from *Film-making Robot* in that it does not rely on the physical distribution of its own body, but on the distributed interactions of viewers, who take on the role of advisors in assisting the computer to generate lists of 'favourites'. Unlike the *Film-making Robot* the *Cloud Shape Classifier* does not make its own aesthetic judgements; it learns by way of the instructions/ decisions made by human viewers. The classifiers do not have their own taste. Instead, as servants for contemplation they seek to please the registered viewer. Through careful training the classifier can anticipate the sorts of clouds that the human viewer prefers. For example, each time a viewer logs in, the classifier will suggest photos that have been gathered and not yet viewed, but that it considers may fit the viewer's previous aesthetic choices.

To save people time in the search for interesting clouds, a computer watches the sky all day, every day. Viewers can interact with the computer via the Internet. It establishes individual relationships with each person, developing an idea of the kinds of clouds they like. When they return to the site they are shown the clouds that have passed that would have been their favourites. Their reactions help refine the computer's idea of their taste. It will also show the greatest clouds by popular opinion. (Bagnall, 2006)

Over time viewers can spend their evenings training the classifier to do aesthetic labour for them. Because of the specificity of the interaction, any notion of an overarching cultural or social aesthetic image is rendered questionable and turned back into a matter of individual pleasure. Because of its need to please, and despite apparently keeping track of repeated favourites, the classifier may decide that according to the information it has received the most popular cloud has in fact 'not been seen by humans' (Bagnall, 2006). In this, the computer demonstrates how aesthetic decisions are individual yet not isolated. Through a process that seeks to numerically eliminate anything that might appear noisy, ugly or un-aesthetic, the *Cloud Shape Classifier* aims to generate pleasing sets of images targeted to individual users. In this world of outsourced aesthetic analysis where, like in any global market, decisions are distributed to those with less power (the computer) before being returned to an individual user (the human), only a concerted effort on the part of the viewer will enable an individual 'classifier' or set of images to begin to distinguish itself from others.

The use of fixed aesthetic algorithms to classify the clouds does not mean that the work is fully determined because the qualifiers used continue to change over time. The work emerges as more and more clouds are photographed and presented to be classified, or as new classifiers are added to the mix and new aesthetic criteria introduced by individual viewers. The introduction of time as a material means that the *Cloud Shape Classifier* presents the aesthetic experience as an emergent event. This mix of materials: cloud, image, classifier,

viewer, time, training, and computer system do not result in a fixed media-specific aesthetic experience, but a continual real-time system of aesthetic redefinition (Burnham, 1969).

Initially, the *Cloud Shape Classifier* reads like a description of the ultimate modern aesthetic machine; one able to separate the construction of an aesthetic experience from the subjective viewer and feed it back to them at appropriate moments. *Cloud Shape Classifier* combines information and noise in a pattern that networked viewers control in terms of both form and material. It is the history of globalised media reception, perception and aesthetics that Bagnall's *Cloud Shape Classifier* engages. The *Cloud Shape Classifier* manages time and information as materials in the construction of the human aesthetic experience. Rather than reasserting the historical divisions of aesthetic judgment and criteria, the *Cloud Shape Classifier* delays the immediacy of the visual experience and as a result highlights the historical fallacy of aesthetic sensibilities.

Where and when aesthetic choice enters a machine, (or any other classification system) an illusion of objectivity arises. At their most everyday aesthetics are today embodied in the ubiquitous 'like' button. 'Liking' is the visible evidence of spontaneous clicking by viewers that not only asserts an aesthetic position, but shares that position with others. In the process of sharing certain 'likes' emerge repeatedly. The 'like' has something particular to do with media and the way in which media structure content, for example YouTube operates as a media for cute cat videos. However these 'likes' belong to the human and not the machine. To address more exactly the place of the machine aesthetic in the twenty-first century it is necessary to retrace the steps that lead to the development of digital machines.



## **Information and digital matter**

The movement in art from the aesthetics of a stable object towards that of real-time process began in the 1940s with the development of digital machines and then reached a key moment in the 1960s with the introduction of informational materials to the art gallery. Machine aesthetics are the result of this history of informational and digital machines. The history is what gives Bagnall's works their specific operations and properties.

From the late 1940s theorists in both America and Europe working with concepts of information and cybernetics began to generate information 'systems' that tended towards the digital (Hayles, 1990; Wiener, 1961; von Baeyer, 2004). The resolution of the digital into a single system initially relied on the binary digits of zero and one; these were its properties. Zero and one were put to work and numerous material devices developed which could speed up their operations. Very quickly, the binary encoding became ubiquitous (and in popular culture today is often seen to represent the only language of the digital). In the influential model of information transmission proposed by Shannon and Weaver in 1949, a sender encodes a message that travels through a channel encountering disruption and noise along the way. A receiver then decodes the message and information (but not necessarily meaning) has been transmitted. Information, defined as both probability and improbability, had no direct relationship to meaning; instead it was simply a 'bit' measure (Shannon, 1948: 379). Shannon offered a structural and, for his purposes, pragmatic definition of information, the concern was with the material operations of information, and noise was something to be eliminated, or at best overcome (Weaver and Shannon, 1963; von Baeyer, 2004). A binary code was chosen because it

utilised the smallest possible number of resources, and thus demonstrated efficient storage, transmission and processing of information, which could simultaneously be assessed for its accuracy, but not necessarily for its meaning. Formatted for a single sender and receiver information was materialised through relationships with noise; that is, entropy (noise within the message) and interference (noise from outside the message) (Hayles, 1990: 55). Noise is not independent of the system, but one of the materials that constitute the system and its relations. To enable more efficient message transmission Shannon designed systems that controlled as much noise as possible, whilst also acknowledging that without some noise, information could not be transmitted. It is this constitutive role of noise that gives information its surprisingly mutable nature.

Shannon understood that information needed to be replicable, but that repetition did not add anything to the information content of a message, and was in fact an impediment to smooth transmission. In Shannon's formulation, repetition is redundancy. Furthermore, he considered pure information to be predictable, and thus not actually information at all. If I tell you something you already know, no information has been transmitted. Too much information is redundant and theoretically not essential to the transmission of a message. To constitute a message, a transmission must contain a mixture of pattern and noise with a minimum of repetition. If noise is the materiality of information, then we understand Shannon by what information *is*. If we add to this the way that the information (as noise, as materiality) operates, we begin to understand what it *does*. Defined in this way information was too important and rich a 'discovery' for it to stay put for long, and information science began almost immediately to haunt aesthetics.

Shows like Jack Burnham's "Software" (1970, Jewish Museum, New York) and Jasia Reichardt's "Cybernetic Serendipity" (1968, ICA, London) opened up material and aesthetic spaces for the aesthetic understanding of information within the art gallery. Primarily the connection between art and information science was read as a concern with the material spaces of transmission – whether practical, conceptual, social or critical. In the 1960s Burnham suggested that real-time activities were crucial to the system that is art (1969: 50). Burnham used the language of cybernetics to suggest that machines when connected with other machines had the potential to "work, ... affect matter and involve man in their doings more everyday" (1968: 321). These connected machines, he suggested, could elicit behavioural responses similar to any 'natural' system. In 1970 he wrote:

Information processing technology influences our notions about creativity, perception and the limits of art. ... It ... is probably not the province of computers and other telecommunication devices to produce works of art as we know it; but they will, in fact be instrumental in redefining the entire area of esthetic awareness. (Shanken, 1998)

As Burnham predicted, digitization introduced a new set of materials to our relations with objects, things and images that resulted not only in the loss of the human's position at the centre of an aesthetic universe, but the redefinition of the entire area of aesthetic awareness via the capacity of the machine. Burnham stopped short of claiming machinic creativity as an aspect of this new aesthetic environment.

Picking up the story again in the introduction to *The Digital Dialectic*, Peter Lunenfeld suggests that the impact of the digital on representational media is found in the recasting of 'everything' as 'digital information.' Consequently, everything can be 'stored, accessed, and controlled by the same equipment' (2000: xvi). For Lunenfeld, the digital

does not represent a technology or a process, but an operational ‘similarity at the level of binary coding’ (2000: xvi). Lunenfeld wants to capture this property of the digital, as he sees it representing a change in the very way humans negotiate the world. The change that interests Lunenfeld is not necessarily in the materials that make up the digital and its codes, but in the impact of these on human reception and understanding. Like Burnham, he argues that digital properties contribute specific challenges to aesthetics.

Representational change is not just about a shift in information production and reception, and cannot solely rely on the operations of the zero and one of the digital binary, as if these two elements always behave appropriately, falling neatly into place and forming unimaginably complex patterns that make digital things go. Although everything can be stored, accessed and controlled by the same equipment, this does not mean that humans retain sole rights to unlimited and uninterrupted access, storage or control. Lunenfeld opens a space where the greatest impact of the digital is the emergence of aesthetics in machines.

### **Emergence and mutation in aesthetics**

The zeros and ones of Lunenfeld’s description are the properties of the digital, they define its shape, but not necessarily its behaviours. Individually they follow rules; they are not emergent (DeLanda, 2011, p.23). As soon as these properties start interacting with other properties they open up the capacity of the digital: it is the capacity of the digital that takes it beyond a state into an event. This is where Bagnall’s works begin to demonstrate that something more than Shannon’s model of information transmission is going on, and this ‘something more’ is in tension with the fundamental materials of the digital. The capacity of the digital depends on its fixed properties, without zeros and ones

the digital would not exist. The digital itself cannot emerge. For example, the robot composes films within an aesthetic ecology that is machinic, based on the properties of the zero and one, and consequently reliant on relationships between information and noise. These properties contain tendencies. For an informational machine one of these tendencies is toward the necessity to define information from noise. The machine's definition is neither visual nor 'aesthetic' but informational, and based on the nature and history of its own neural networks. The robot's nature means that in order to function it must obey the rules of information transmission established by Shannon and Weaver and strive to create information freed from noise. However, digital capacities are events that together make up the tendency of the digital to form machines as part of an active assemblage with humans. In the formation of machines, affecting and influencing other kinds of matter, emergence occurs.

Lunenfeld defines the possibilities where, through a focus on the particularity of the digital (its properties), the emergence of machinic capacities may indeed include aesthetics.

Bagnall's works take one step further and claim a place for machine aesthetics. Both the works discussed here depend on the programming of their respective digital systems to recast 'everything' as digital. However, there is more to these works than a straightforward reliance on, or presentation of digital technologies as technologies and 'everything' as digital.

Because of a joint reliance on the behaviours of information and aesthetics, these works demonstrate the emergent forces of digital capacities, rather than the fixed properties of digital binaries, as key to understanding things digital. Bagnall's machines are not the biological hybrids imagined by Capek, or the mimetic automatons of Drot, but are digital assemblages that include the aesthetic decision making tools previously held only by human

creatures. In this, they also expand Lunenfeld's definition of the digital to include representational and perceptual operations beyond the zero and the one.

If these works really do move beyond the zero and one (but not completely escape it) they leave behind them a tension in the way that information might contribute to the understanding of machine aesthetics. As I have suggested, the process of emergence generates new aesthetic engagements that themselves contribute other potentialities for emergence within the ever-shifting viscosity of the work. In *Cloud Shape Classifier* and *Film-making Robot* this occurs through a process that treats aesthetics and information as the same property when the works are in training. Because of this informational attitude to aesthetics, Bagnall's works expose aesthetics as an emergent property of art, and not a fixed system of classification. Aesthetics becomes an emergent media form through which the human and the machine interact. To resolve the slippage that is occurring between machine, human, information and aesthetic it is necessary to address emergence from a different perspective before returning one last time to the works themselves.

Emergence is a tendency of information systems. Shifting the ground from a consideration of biological systems to technical and informational ones, Norbert Wiener argued that the fundamental law of emergence is that the behaviour of individual agents is less important than that of the overall system (Wiener, 1961). Jack Burnham used Wiener's ideas of emergence to articulate an approach to real-time systems in art. Burnham quotes Hans Haake's (1969) 'untitled statement':

A 'sculpture' that physically reacts to its environment is no longer to be regarded as an object. The range of outside factors affecting it, as well as its own radius of action, reach beyond the space it materially occupies. It thus merges with the environment in a relationship that is better understood as a

'system' of interdependent processes. These processes evolve without the viewer's empathy. He becomes a witness. A system is not imagined, it is real. (Burnham, 1968)

Haake and Burnham describe the artwork as an information and aesthetic system that is greater than the occupation of material space, and can occur with or without the viewer. The real-time identified by Burnham is essential to thinking through the possibilities of emergence within informational and binary forms such as Bagnall's aesthetic machines.

Literary critic Katherine Hayles suggests that media are structures that are shaped and produced by their use and content (2003: 6, 33). Hayles uses emergence as both a description and a methodology for our encounter with hypertextual media (2003: 33; Hayles, 1999). Hayles connects media with emergence through the operations of what she terms, 'flickering signification' (1999: 46). Emergent properties are tied to the work's materiality and are part of the experience of viewing. When Hayles looks at hypertext she sees patterns (such as the binary '0' '1' '0' '1') resulting in a situation whereby 'any symbol can appear in any position' (1999: 32). Problematically, this means that pattern cannot invite or contain mutation, simply more pattern. In other words, the pattern will tend toward the periodic, and the shifting pattern of the pattern will overrule any potential mutation. This is a problem because mutation is essential if a text is to emerge, or contain emergent properties. As Hayles explains: 'Mutation normally occurs when some random event...disrupts an existing pattern and something else is put in place instead' (1999: 32-3). That something else has to be more than the original, for example a mutation of '0' '1' '0' '1' might be '0' '1' 'k' '0' 'x' '1'. Mutation is thus the 'bifurcation point' between pattern and randomness (Hayles, 1999: 33). It is here that a system can emerge. Once mutation occurs the pattern is never the same, and as a result, we can only understand the passing of pattern through mutation. Hayles turns the

equation around: ‘The randomness to which mutation testifies is implicit in the very idea of pattern, for only against the background of nonpattern can pattern emerge’ (1999: 33). Pattern becomes a kind of analogical end-point, and mutation the aesthetic moment. As Hayles makes clear, mutation as a process or vehicle for change puts ‘something else’ in place (1999: 32-3).

In Hayles’ equation it seems that every pattern tends towards mutation. So, where is mutation located? Is it in between patterns, is it in the reception of the pattern, or as Lunenfeld suggests, does it remain locked in a binary relationship with pattern? To invoke pattern in Bagnall’s works also takes us back to the material properties of the digital. Not to the zero and one of code, but to the pixel of the digital image. To make their aesthetic decisions, the robot and the classifier both use pattern to read pixels as numbers. A pixel is a picture element, the result of visual atomism – the breaking of digital images into chunks. In itself the pixel does not contain information. It is only in relationship to other pixels that the pixel begins to occupy a visual space and can be read as information. And because information contains and is formed from noise, no single pixel is a pure information space. As New Zealand artist Stella Brennan writes: ‘A dirty pixel is no longer an uninflected container of information; it has its own, corrupted character’ (2002: 2). For the visual digital image the pixel can be considered the final frontier. No matter how small it gets, the pixel remains a determining aspect of the visual experience of the image. The pixel however does not mutate. Mutation occurs in the patterns of information, aesthetics and perception contained within the pixel. In this sense the mutation is implicitly linked with noise, rather than with a (perhaps more familiar) biological understanding. It is more like the weather patterns that are reflected in the clouds watched by the robot. Prone to frequent change and alternation the weather is inconsistent, mutable. Mutability is not accidental change, error, or random variation. It is



found within the complex contingencies of machine learning, human input and the visual source material.

One final way to think about the formation of machine aesthetics via emergence and mutation is to think about the way the works function as distributed assemblages rather than as complete material entities (Deleuze and Guattari, 1988: 91). To suggest that Bagnall's works are assemblages does not mean that they become fixed. In his argument about the historical processes that make up any material entity Manuel Delanda (2011) revives a discussion of the properties, capacities, and tendencies of materials. It is this approach that has parallels with those of new aesthetics: things are not reduced to their types but tendencies and relationships between informational materials and aesthetics are highlighted. Emergence is a tendency of these informational aesthetic systems that are defined by rules (faithfully followed) but where global outcomes exceed the local rules. In Delanda's understanding mutation and repetition are two material processes that may occur at different temporal and physical scales. Perceiving these processes opens up the assemblage to a further process of 'relating each concept to variables that explain its mutations' (Deleuze, 1990: 31). This approach reminds us that perception has never been a simple one-way view out from a subject. Deleuze explains that 'perception is not the object plus something, but the object minus something, minus everything that does not interest us' (1990: 25). Deleanda's complex assemblages always in-formation, plus Deleuze's selective and relational process of perception, together parallel the process Shannon anticipated for information transmission and reception. It is also the process shared by the robot, the classifier, and the human viewer as they assess the images before them.

*Cloud Shape Classifier* is one such emergent informatic assemblage. Emergence occurs in a number of locations within the work. The photographs of clouds (although containing individual aesthetic triggers) are less important than the system or process of classification and the informational choices made as each cloud is addressed. The final set is only provisional, and only existent within a particular classifier. The material of classification can quickly shift form and another classifier emerge. This emergent process is not something special or new, it is part and parcel of the work being informational. *Cloud Shape Classifier* and *Film-making Robot* share emergence – as both a property of the individual parts and as a kind of meta-system – with other informational works. The impact of emergence within informatic systems and consequently within art that engages such systems, highlights transformation, uncertainty, and the mutability of aesthetics. However it is important to remember that although emergence might complicate simplistic ideas about linear causality there's nothing inherently unpredictable about emergence in digital contexts. Shifting relationships between pattern and mutation control the individual classifiers of the *Cloud Shape Classifier* as aesthetics are fragmented. There is variation and change, but that change is accommodated by the work's code and software, it is incorporated into the digital. *Cloud Shape Classifier* illustrates mutability but not as a result of break down, rather it shows how mutability can occur through the faithful functioning of the digital.

The discrete and non-periodic operations of digital emergence mean that there is no endpoint at which the work can be said to be complete; to have emerged and reached a point of aesthetic resolution. Even if one classifier is fully trained, there is the potential for exactly the same cloud to be given a different 'rating' by another classifier. Not all 'likes' are equal. The shift that occurs is in the aesthetic parameters of the classification, where beauty is only temporarily in the eye of the beholder. What emerges is a series of specific and particular

understandings of the aesthetic experience of gazing at clouds, all obtained without the explicit necessity of the ‘cloud’ itself. Furthermore, because this experience is always emergent and never resolved, the *Cloud Shape Classifier* never gives us the ‘ahhh’ of a perfect aesthetic cloud-moment. Tomorrow will bring a better, more pleasing, like-able cloud. This is the paradox that the *Cloud Shaped Classifier* shares with the *Film-making Robot*. They are both network-based classifiers operating through machine learning algorithms which offer a probabilistic, statistically based form of reasoning – beautiful or ugly, near or far. The experience of this structure highlights the unpredictability of any form of aesthetic classification whether human or machine. Aesthetics is shown to be much more than a fixed structure of taste belonging to the social subjects called humans. Nonetheless some viewers will not believe that the robot has been left alone to make its films, arguing that they are ‘too beautiful,’ or ‘a robot couldn’t do that, he’s cheating’. [2]

The *Film-making Robot* makes films by engaging the digital materials of time, information and noise. Viewers experience the finished films as aesthetic objects. The *Cloud Shape Classifier* also works with learnt informational patterns as it analyses and selects ‘good’ images of clouds on behalf of its viewers. In a context within which everything has been recast as digital, have these two works genuinely effected some form of representational change? Is this ‘new aesthetics’? Within the ecology of film-making and reception the *Film-making Robot* efficiently distributes the properties and capacities of film-making in such a way that it is possible for unique films to be composed by a robot within a single 24 hour period. Similarly, the *Cloud Shape Classifier* uses aesthetic criteria to shift collective definitions of aesthetics. Each work shifts the spaces of aesthetic reception outside the gallery and into networked social ecologies. The robot eye travels the streets that its viewers watch from the gallery, and the classifier eye stares out the window of a gallery while its viewers

approach it from any suitable networked location. Both works enable robots to make independent aesthetic decisions, and present these to audiences who accept the outputs as appropriate within gallery contexts. Neither work is an artificial intelligence; they do however ‘perceive’. The *Film-making Robot* composes films. The *Cloud Shape Classifier* anticipates the aesthetic choices of its viewers. Both works record what they see digitally and together they stockpile time as a material. In this space of mechanised perception the thresholds of representation and reality are challenged.

### **Machine aesthetics**

To end this essay I want to suggest that these two works by Douglas Bagnall might reflect aspects of a broader and more complex ethico-aesthetic experience that is currently being described as ‘new aesthetics’. The experience of ‘new aesthetics’ occurs through the coming together of machine and aesthetics in a specific kind of machinic assemblage. This assemblage is not only made from multiple and various components, but operates within a fluid and often unequal field (Guattari, 2000: 68). New aesthetics demonstrates how perception is interactive and complex as the human viewer distinguishes between information and noise, beauty and whatever its opposite might be. Bagnall’s works utilise algorithmic processes and turn them into aesthetic tools. In the material distribution of the *Cloud Shape Classifier* and the *Film-making Robot* the gallery environment is opened up to mutable informatic and aesthetic systems. As a result, the operations of information and aesthetics are found to be very similar. This is because both are the result of the capacities of the digital. Simultaneously both works distribute the space of the work and the space of the gallery. The viewer of clouds occupies an online environment specially constructed for cloud sorting, and the eyes of the robot travel through a city leaving the viewer in the gallery with the final

result of its activities. As infomatic and machinic systems both works operate within a contemporary visual environment, within which viewers are already familiar with the layered positions of information and aesthetics.

Until recently machine aesthetics were considered shorthand for a fascination or celebration of the machine, a kind of techno-utopianism. In 2012 the phrase ‘new aesthetics’ arose, firstly as a response to the kinds of images that contemporary machines seem to be producing and secondly to the redefinitions of aesthetic awareness that these networked aesthetic machines seem to be suggesting (Bogost, 2012). Human experience and the study of the senses is being repositioned away from the centre and the machines that surround humans do appear to be capable of producing works of art (Bennett, 2010: 21). Through their enforced material distribution, the *Film-making Robot* and the *Cloud Shape Classifier* activate the aesthetic grounds of the machine. As the *Cloud Shape Classifier* looks out the window it encounters both information and noise. When we watch a film made by the *Film-making Robot* what we see is a film of vibrating perceptive decisions based not on the digital but on the flickering on and off of machinic aesthetics. The experience of both works shifts from a remembered event full of glitches and stammering, to a distributed recording (or collection) able to be manipulated on demand, forever.

In the Software exhibition Jack Burnham wanted to ‘produce aesthetic sensations without the intervening “object”’ (Shanken, 1998). The method for this was to introduce systems beyond those of ‘art’ and to use ‘software’ as both a conceptual and literal way to make things happen. In the 1960s the system had the potential to be conceived as a medium. In this essay I have suggested that the equation is not so simple. In Bagnall’s works the system is not a

medium, but is a way of linking the informatic with the aesthetic. As machinic assemblages Bagnall's works challenge the pre-modern idea that only humans possess aesthetic capacities, at the same time as operate as foretellers of the 'new aesthetic' understandings of machinic vision.

Manuel DeLanda (2011) outlined the possible mechanisms of emergence within specific entities through an analysis of the properties, capacities, and tendencies of materials. Through this essay I have utilised this materialist view to help me further define what a machine aesthetic might be, and the impacts it may engender. I have addressed the limitations of a property-based understanding of the digital. I have suggested instead that understanding the digital through its capacities and tendencies that are both aesthetic and informational determines not only the viewer's understanding of the artwork but also what that artwork is. In addition, this approach to aesthetics and information implies that it is not possible for digital artworks to be understood as singular and fixed objects external to their viewers and the systems they embody in. Together Bagnall's aesthetic machines suggest that we consider how aesthetics form provisionally from emergent capacities. Of course, this is what watching clouds has always done.

## **Endnotes**

[1] It is worth noting that when this work was invited to show at ISEA2006 in San Jose it did not work because of the lack of free wireless hubs in the centre of Silicon Valley – the birthplace of much technology the robot is made from. Like Donna Haraway's (1991) cyborg its evolutionary myth did not allow access to the gates of Eden.

[2] When I presented a discussion of Bagnall's works at DAC2007 in Perth Australia an audience member took offence, saying both I and Bagnall were cheating and that the films were fakes.

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### **Art Works Discussed**

Douglas Bagnall (2004) *Film-making Robot* networked digital installation. A joint project of Enjoy Public Art Gallery Wellington and ZeroOne SanJose / ISEA 2006, with network hosting and support from CityLink Ltd.  
<http://halo.gen.nz/robot> Reproduced with permission of the artist.

Douglas Bagnall (2006) *Cloud Shape Classifier* networked digital installation. Exhibited as part of Telecom Prospect curated by Emma Bugden, City Gallery and the Film Archive of New Zealand, Wellington.  
<http://cloudy.halo.gen.nz> Reproduced with permission of the artist.