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Mutable aesthetics: emergence in digital installation

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INTRODUCTION

In order to make the claim that the aesthetic specificities of digital art practices are about more than their technologies, this paper contends that the micro- and macrocosmic realms of information theory are applicable and useful in the field of art history. In his introduction to *The Digital Dialectic*, Peter Lunenfeld presents the impact of the digital on representational media as the recasting of "everything" as "digital information." Consequently, everything can be "stored, accessed, and controlled by the same equipment" (Lunenfeld 2000, xvi). For Lunenfeld, the digital does not merely represent an aesthetic, or a process, but operates from "similarity at the level of binary coding" (xvi). Lunenfeld wants to capture this moment of the digital, as he sees it representing a change in the very way we negotiate the world. But representational change can not simply rely on 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 simply make digital things go. The zero and one of the digital binary often slip up. Although everything can be stored, accessed and controlled by the same equipment, this does not mean that we have unlimited and uninterrupted access, storage or control. The process of digitization results not only in the loss of continuity, but also in the gain of noise. A number of recent digital art works such as the networked digital installations and films by New Zealand artist Douglas Bagnall use the complexity of programming to create works that appear to recast "everything" as digital.

Figure 1. Douglas Bagnall. Still image by *Film-making Robot* (August 2004).

This paper will focus on Bagnall's *Film-making Robot* (2004) and *Cloud Shape Classifier* (2006). These works question the very ability of the digital to effect representational change. In both works, Bagnall employs an approach to digital art that (like information theory) insists on a commitment to looking at intrusions, interference, and impurity. These works rely on the technologies of the digital but operate through the techniques of art's histories (including those of film). In this, they expand Lunenfeld's definition of the digital to include the representational and perceptual operations of mutable spaces in between the zero and the one.

Bagnall's *Film-making Robot* is the ultimate cinematic apparatus incorporating the mechanism for both filming and screening the work within the auteur itself. On his website (http://halo.gen.nz/robot) 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 *Film-making Robot* makes use of existing telecommunications networks in order to make films that reflect the particularities of the city in which the robot lives and travels. Traveling in Wellington's Stagecoach buses the robot films what it sees. 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, (which I will discuss in more detail soon) the robot assesses each frame and compiles the final work. The robot's films reflect something of this learnt (rather than understood) film aesthetic. As Bagnall himself says: "I used to be a film maker, now I help robots to make films" (Bagnell 2004). 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. It is essential to both the distribution and the creation of the work. (It is worth noting that when this work was invited to show at ISEA2006 in San Jose it was unable to be installed 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 Haraway's cyborg, its evolutionary myth did not allow access to the gates of Eden (Haraway 1991)).

Cloud Shape Classifier differs from *Film-making Robot* in that it relies less on physical distribution and more on the interactions of viewers, who take on the role of advisors in assisting the computer to generate lists of 'favourites'. The *Cloud Shape Classifier* pitches itself at the viewer as a useful tool, particularly for those without time for cloud gazing (Bagnell 2006):

> 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.

Through a process that seeks to numerically eliminate 'noise' or un-aesthetic cloud shapes the *Cloud Shape Classifier* generates pleasing sets of images. These images are grouped by 'classifiers' that can be trained collectively or by individuals. (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.) The computer learns by way of the decisions made by viewers, and tries to show viewers only clouds that fit their individual tastes. The classifiers do not have their own taste, as servants for contemplation they seek to please the registered viewer, and through careful training the classifier can anticipate the sorts of clouds that the viewer favours. 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 (Bagnell 2006):

> 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.

Because of the specificity of the interaction, any notion of an overarching aesthetic image is laid questionable and turned into a matter of taste. Despite keeping track of repeated favourites, the computer may decide that according to the information it is fed, the most popular cloud has in fact "not been seen by humans" (Bagnell 2006). In this, the computer demonstrates how aesthetic decisions do not exist in isolation. Only through a concerted effort on the part of the viewer will an individual 'classifier' or set of images begin to distinguish itself from others. The computer's perception of zero and one locates differences in representation in repetition, pattern, and gaps in between.

As these brief descriptions demonstrate, both the *Film-making Robot* and the *Cloud Shape Classifier* depend on the programming of their respective digital systems to recast "everything" as digital. However, as the remainder of this paper will suggest, there is more to these works than a straightforward reliance on, or presentation of digital technologies. In order to explain what this might be I need to explore some broader contexts of digital materiality and notions of aesthetics. I will suggest that because of a joint reliance on the technologies of information and aesthetics which both tend toward purity and communicative resolution, these works locate noise as a key material of the digital.

Figure 2. Douglas Bagnall. Screen projection of *Cloud Shape Classifier* at ISEA San Jose, 2006.

A BRIEF DISCUSSION OF NOISE

Everything may be digital but not everything is a zero or a one. As it toys with the realms of art and aesthetics the digital becomes reliant on gaps in transmission and spaces in between; noise. It is this reactionary position of noise as the unwanted or repressed aspects of communication and representational processes that brings together information theory and the aesthetic and visual traditions of art history. In making this assertion this paper foregrounds a diplomatic move which locates noise as a player between the politics of art and media, and offers noise as a mutable tool of redress for both art history and digital aesthetics. Before I discuss the works in more detail I need to expand a little of the background to my use of noise and aesthetics.

For Claude Shannon and others working on the perfection of communication, noise was something to be eliminated, or at best overcome (Shannon 1948; von Baeyer 2004; Weaver and Shannon 1949). Shannon was concerned with the material operations of information. In the most basic model, as proposed by Shannon and Weaver in 1948, a sender encodes a message which travels through a channel encountering disruption and noise along the way (Weaver and Shannon 1949). The message is then decoded by a receiver and information (but not necessarily meaning) has been transmitted. To enable more efficient message transmission, Shannon designed systems that repressed as much noise as possible, whilst also acknowledging that without some noise, information could not be transmitted. In this model noise is found in two places; firstly, as it is encoded within the transmission process, and secondly, as an interruption to the flow of information.

This attention to noise has another history found within experimental and avant-garde music. In 1961 John Cage famously wrote (Cage 2004, 25-26):

> Wherever we are, what we hear is mostly noise. When we ignore it, it disturbs us. When we listen to it, we find it fascinating.

Noise for Cage was productive of listening, and thus interaction. Listening to noise means that we can shift preexistent structures and habits. This idea resonates with Jacques Attali's political definition of noise. Attali's definition is political because it locates noise as an operation of power across and within society. Attali writes (1985, 26):

> Noise, then does not exist in itself, but only in relation to the system within which it is inscribed: emitter, transmitter, receiver.

In bringing together Shannon and Cage's radically and pragmatically different approaches to noise with the politics espoused by Attali, it is possible to trace the role of noise within the divergent discourses of information and aesthetics. These shifting roles or definitions make noise worthy of attention, particularly with regard to works that classify everything as digital. Because of their relationship to noise, both *Cloud Shape Classifier* and *Film-making Robot* highlight the role of information in the aesthetic realm of digital installation.

Relations between aesthetics and contemporary installation have been discussed from a number of angles (Bourriaud 2002; Lee 2004; Lippard 1973). Towards the end of *Relational Aesthetics,* French curator Nicholas Bourriaud writes about how the digital image "renders virtualities material in x dimensions" (2002, 71). Bourriaud is interested in movements away from objects and the fixed subjects he sees that they form. This statement is a little out of character, as much of Bourriaud's text dismisses the challenges to his schema posed by digital and new media works. In thinking about the materialisation of virtuality, he draws on French theorist Felix Guattari's ecological model within which subjects form by way of material flows and crystallisations (Guattari 1995). The connection for Bourriaud is with the social object which is behavioural and "produce[s] models of relations with the world" (Bourriaud 2002, 78).

New media theorist Matthew Fuller also draws on Guattari's ecological framework. For Fuller, a media ecology is similarly relational, and he too uses a notion of dimensionality to describe, as he defines it: "the modes or dynamics that properly form or make sensible an object or a process" (Fuller 2005, 2). Fuller's ecology though, comes with a warning. Not every form is compatible with any other, or as he puts it: "not all parts of this media ecology quite fit together: try plugging a Nintendo into a Sony" (2005, 118). Unlike Bourriaud, Fuller understands that any ecology contains noise; present as fragments and spaces where behaviours, subjects and objects do not neatly coalesce into polite relational frameworks. This is because the objects and images Fuller discusses are informational. Like the works discussed in this paper, they are infected by the structures and systems of electronic media. The implication in Fuller's ecological model, that is extended through this paper, is that noise is an integral aspect, force and process as well as material, through which digital media operate, and are potentially defined. For the remainder of this paper when noise is discussed it is within the context of information ecologies where noise is both a material and a process. Digital materials then, are not simply physical and tangible surfaces, but noises that encompass information, content, and noise. Digital materials are the 'stuff' from which digital things are made, including networks, repetitions, mutations and the code or algorithm upon which they sit.

Figure 3: Peter Robinson. *Divine Comedy* (2001). left: detail, *Sartre's Worm* digital print; right: installation view with *Sartre's Worm* on left wall, 49th Venice Biennale, 2001.

INFORMATION (ZEROS & ONES)

It is not hard to see where the fractured spaces of digital art are haunted by histories of information science. Primarily this is because like art, information science is concerned with the material spaces of transmission – whether conceptual, social or critical. In the context of art something is made to be seen, understood, viewed, or presented as a series of relationships which might be established between individuals, groups, environments and sensations. Understood this way, art is an aesthetic relationship between differing material bodies, images, representations, and spaces. It is an event.

In Shannon's communication model, information is not simply complicit with noise; it is totally dependant upon it for understanding. Without noise, either encoded within the original message or present from sources outside the channel, information cannot get through (Shannon 1948, 379-394). Noise is both process and a material – it is the substance through which information travels. Information understood in this way is also about relationships between differing material bodies, representations and spaces, connected together for the purposes of transmission. It, too, is an event.

Information, like light or energy, is not solely a quantifiable entity (Virilio 1995, 138). Moreover, like light and energy, the transformations that it might make on material objects can be mapped. In this

context it does not matter if the transmission is performed using digital or analogue technologies, the material forces at play are the key focus. However, from the late 1940s theorists in both America and Europe working with concepts of information and cybernetics began to generate 'systems' that tended towards the digital (Hayles 1990; von Baeyer 2004; Wiener 1961). The resolution of the digital into a single and reliable system relied on the binary digits of zero and one. Zero and one were put to work and numerous material devices developed which could speed up their operations. Very quickly, the binary codec became ubiquitous and as a result is often seen to represent the only language of the digital.

The ease of transferability, and the instant recognition of the digital as equivalent to the binary meant that the digital binary became a coded representational tool, with the ability to stand in for other binaries, for example, hot cold, black white. This was a visual correspondence, and one that artists interested in playing out issues of the binary as a cognitive or philosophical tool found easy to use. New Zealand artist Peter Robinson's *Divine Comedy* is a series of fibreglass sculptures and digital prints first exhibited as part of New Zealand's inaugural showing at the 48th Venice Biennale in 2001. Through explicit use of the visual binary 0 and 1, the large wall pieces layer information, semantics and noise. In *Sartre's Worm*, a digital tukutuku lattice is spread with the red, white and black of kowhaiwhai rafter panels. The colour and the pattern provides visual information familiar to a New Zealand audience, and recognisable as 'Maori' to many viewers. Instead of the 'x' of crossing fibres, which make up the traditional tukutuku pattern, Robinson has used the basic tool of information, the binary digit to address distortions of language and code. To those who can read ASCII, the work contains twice over a citation of Jean-Paul Sartre's text. As part of an online discussion on the work, Douglas Bagnall offered the ADA (Aotearoa Digital Arts) discussion list a literal translation of the ASCII code (Bagnell 2004, July 21):

> Nothingness li%s #oiled in the heart of being `like a wwrm.

In this translation the errors are obvious, and to Bagnall they mark the "failure of binary code to express a critique of binary cultural logic." Bagnall continues, "It can't even get the words out. This nicely signifies how little the two binaries have to do with each other" (2004, July 21). In the context of the rest of Robinson's installation, the wall piece serves as a backdrop to a series of sculptural pieces that seem to generate some kind of extra-terrestrial world of inadequate symbolic language. The contradiction of the spelling (or is it a coding) mistake is central to the social and political ground Robinson is traversing. Binaries, whether of the zero and one of the digital or the black and white of social politics, can often end up with noise or errors simply because of the impossibility of a structural need for numerical repetition or pattern. (One of Robinson's early paintings *3.125%* (1994) represents the politics of Robinson's own whakapapa (ancestry) identifying as 3.125% Maori, and the absurdity of such a numerical representation.) Isolated, although retaining a relationship to a spiraling Op-Art and Sci-fi aesthetic, *Sartre's Worm* suggests that a direct correspondence between meaning and information cannot be assumed. The translated sentence can be understood as we can read past the typos (if indeed they are typos). As such, information has traveled the noisy communications channel. Presented as pattern the code is made from a smooth repetition that, because of its need to mirror itself, must contain translation errors – the typos are not in the pattern, but in the reading of the pattern.

Other commentaries on Robinson's work have highlighted the "universality" of ASCII code and the implications of "international languages" found in the digital (Barton 2001-2002; Miles 2001; Stanhope 2004). Bagnall questions this assumption of purity within the digital code, and the implications (within the commentaries) that digital code is "purer, deeper, more universal, more infinite than our own languages" (2004, July 21). Digital code maps directly onto American English, but its assumed purity or universality for other languages certainly needs to be questioned. Rather than address a pure universal language, Robinson actually makes explicit our assumptions about translation. Languages, like other cultural constructions, do not contain a direct one to one correspondence, nor do their systems (patterns) map neatly on top of each other. Following Shannon's arguments, there is a necessary presence of noise in any message transmitted from a sender to a receiver (Shannon 1948). Noise enters the translation, and if we choose to, or are able to read or decode the work, gives us more than a pure or universal language ever could. Read through Shannon's noisy lens of information transmission, with the aid of Bagnall's translation, *Sartre's Worm* presents a relationship between sampling and the politics of translation, including the informational context within which translation is assumed to have occurred.

I focus on this work because Bagnall's translation and the discussion it engenders introduces a number of concepts key to my reading of Bagnall's own works. These are the role of information in image-making and digital installation, and the subjective relationships of translation and aesthetics. One way to unpack further the implicit correlation between code and information (and the implications of Robinson's insertion of visual digital code into the already coded spaces of the gallery) is to examine more closely, some of the histories of information theory. Shannon offered a structural and, for his purposes, pragmatic definition of information. Information, defined as both probability and improbability, had no direct relationship to meaning; instead it was simply a 'bit' measure (Shannon 1948, 379). 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). Significant to this formula was the mediation of the process through which the information traveled. Katherine Hayles (1990, 55) emphasises that Shannon's schematic

> made clear that there is no such thing as an unmediated message. By dividing the communication system into a sender, an encoder, a channel, a decoder, and a receiver, Shannon demonstrated that any message is always subject to the intrusion of 'noise'.

Shannon's acceptance of the ever-presence of noise returns us to my earlier suggestion that we use noise to reassess the material conditions for the production of aesthetic response in a digital installation. These conditions include: the materiality of information itself – noise; the materiality of meaning production – language; and the materiality of aesthetic reception – culture. In *Sartre's Worm* Robinson carefully weaves the visual languages of tukutuku with the coded languages of ASCII, and the systems languages of digital installation. If *Sartre's Worm* is to be read as an information message, the intrusion of noise is not simply to be ignored, or read past, but is evidence of the improbability (impossibility) of a perfect translation. This is something that Shannon already knew when he constructed his model of communication. Because of the uncertainty principles of noise, information had to be understood as negentropy, a complex position whereby information is understood by way of its opposite – noise – which is also its material. Robinson's work serves as an introduction to the problematics of information when it enters aesthetic relationships of translation, coding and visual pattern – themes which recur throughout this paper. My argument needs to move away from Robinson's work but will take with it a set of lingering questions. Does an uncertainty about the materials, and construction and classification of digital installation mean that a viewer relies on the intellectual (meaningful) exercise of translation, rather than address the installation as a whole, as matter?

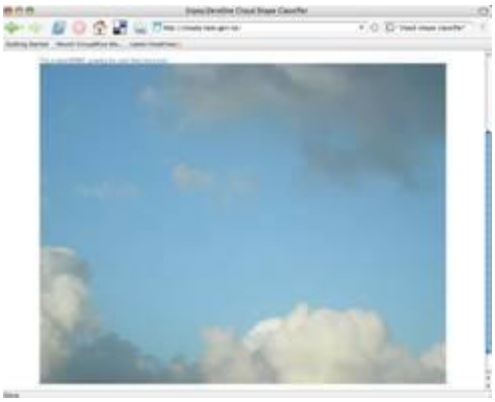

Figure 4. Douglas Bagnall. Screen grab *Cloud Shape Classifier*. "This is Cloud #7897, possibly the most liked cloud ever." 5 January 2007.

AESTHETICS (EMERGENCE & MUTATION)

Gallery spaces are specific coded environments. The arrival of New Zealand on the outskirts of the Venice Biennale presented Robinson with a particular layered environment to explore issues of translation. In a more modest way, Bagnall's *Cloud Shape Classifier* also works to unpack some of the material conditions of the international gallery scene. However, this is not its main operation. Ostensibly, the *Cloud Shape Classifier* is a tool for the overworked, directed at those who perhaps

spend too much time traveling the Biennale circuit, unable to look at the clouds. Instead, they can spend their evenings training the classifier to do the aesthetic work for them.

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 description on the website reads (Bagnell 2006):

> *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.

Initially, this reads like a description of the ultimate aesthetic device; one able to separate the construction of an aesthetic experience from the subjective viewer. However, and despite layers of social assumptions including class, value, morality and ethics, aesthetics has historically depended on a notion of subjectivity (Korsmeyer 1998). It is where and when aesthetic choice enters a machine, (or any other classification system) that objectivity becomes a potential aim. For example, following such a desire to classify experience, Gotthold Lessing identified and fixed the differences between painting and poetry in his seminal text *Laocoon* (Lessing 1963)(first published in 1766). *Laocoon* is an essay on how to read and thus approach different media through the manner in which each reproduces, or imitates, or reflects, their respective subject matters. For Lessing, each medium discussed possesses "peculiar" and "specific" qualities (1963, 88). The key difference he identified between poetry and painting was of time and space (Lessing 1963, 90):

> …one is a visible progressive action, the various parts of which follow one another in time; the other is a visible stationary action, the development of whose various parts takes place in space.

Visual art fell on the side of space, leaving time to the poetic and literate arts. This difference lead Lessing to a consideration of the relationships of what he termed objects, signs, bodies, and actions: "bodies with their visible properties are the peculiar subjects of painting … actions are the peculiar subjects of poetry" (Lessing 1963, 91). Essentially, Lessing's divisions between visual art and poetry according to space and time were based on the belief that each medium had something it did best. His division of media into specific internally located qualities meant that it was possible to identify, or even predetermine, what was appropriate subject matter for each medium. Almost as soon as these kinds of media divisions were asserted two things happened. Firstly, the boundaries became further entrenched as a formulaic aesthetic judgment determining exactly what and how a medium should behave (taken to its extreme in the early Twentieth Century by Clement Greenberg (1961). Secondly, these same boundaries were questioned and disrupted (Lee 2004; Lippard 1973). By the mid Twentieth Century the entrenched divisions of media into sensory alignments of time and space had significant implications for the reception of new media in both galleries and histories of art. However, despite the valiant efforts of many of art's institutions, it became increasingly difficult to maintain distinctions between time and space, as performance, happenings, experimental film and sound entered the spaces of the art gallery. It is this history of media reception, perception and aesthetics that Bagnall's *Cloud Shape Classifier* engages. The *Cloud Shape Classifier* introduces time and information as materials in the construction of the aesthetic experience. Rather than revisiting and reasserting the historical divisions of aesthetic judgment and criteria, the *Cloud Shape Classifier* inserts time into the visual experience and as a result highlights the historical fallacy of media divisions.

The implications of the introduction of time as a material are that the *Cloud Shape Classifer* presents the aesthetic experience as an emergent event. Emergence as uncertainty and unpredictability presents a challenge to established notions of fixed media. The *Cloud Shape Classifier* does not operate on media, that is, it does not have a medium, as say a painting of a cloud might; instead, the *Cloud Shape Classifier* uses aesthetics to generate emergent materialities. *Cloud Shape Classifier* combines information and noise in a pattern that networked viewers control both in terms of form and in terms of material. Despite its training in, and use of aesthetic qualifiers (which, as I have just outlined, are dependant on the distinctiveness of media) the resultant experience for the viewer is not ever fully resolved. The work continues to emerge as more and more clouds can be classified, or as new classifiers are added to the mix, or as new photographs are taken, and new aesthetic criteria introduced by individual viewers. This mix of material: cloud, image, classifier, viewer, training, and computer system does not result in a media-specific aesthetic experience. What is generated is a

relational experience of emergent materiality. To find out what the potentials of such a material experience might be, it is necessary to further define emergence.

Emergence

In one of the more populist texts on emergence Steven Johnson argues for a reading of emergence as systematic social, biological or cultural change driven by a "bottom up" process (Johnson 2001, 54). Emergence in this model is closely tied to feedback, where "circuits reverberate" and there is a "subtle sense of information being plugged into itself in ever more baroque ways" (Johnson 2001, 134-6). This form of decentralized change management within a system is designed to generate adaptations in order for the system to respond to forces both within and without. Drawing on Norbert Wiener's arguments, Johnson presents the fundamental law of emergence as the behaviour of individual agents being less important than that of the overall system (Johnson 2001, 136) (Wiener 1961). This means that the system is not simply representational; it has rules. He writes (Johnson 2001, 158):

> What's interesting here is not just the medium, but rather the rules that govern what gets selected and what doesn't. It's an algorithmic problem, then, and not a representational one.

In introducing the term 'representational' Johnson opposes emergence with a reflective (representational) process in which the medium can be 'seen' to transform. Representational change describes what a medium presents, or looks like. When shifted across media (say a film screened as 35mm print in a theatre, and the same film as a downloadable quicktime loop) the work may appear completely different, however it has simply moved media rather than materially emerged. Emergence is a material algorithmic process and not representational change occurring within the medium of informatic systems. It describes much more than a shift in media. Johnson's analysis highlights the importance of a separation of our concepts of medium and material. The emergent transformation occurs at a material level; it is more than what can be seen (and thus is more than representation). The impact of emergence within informatic systems highlights transformation, uncertainty, and the potential redundancy of any notion of medium.

Cloud Shape Classifier is one such emergent informatic (and thus material) system. Emergence occurs in a number of locations within the work. The individual 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. I should also make it clear that this emergent process is not something special or new, it is part and parcel of the work being digital. In this, *Cloud Shape Classifier* shares emergence – as both a property of the individual parts and as a kind of meta-system – with other digital works.

Because of this digital attitude to emergence, both of Bagnall's works discussed here expose aesthetics as another emergent property of a digital work, and not a fixed system of classification. Furthermore aesthetics becomes a tool for the definition of pattern (information) and mutation (noise). In this way aesthetics is shown to be an extremely useful tool to challenge information classification. This aesthetic disruption of pattern and mutation, due to matters of choice, perception and taste, means that slips and gaps in between patterns become a way to redress the spectre of the digital binary. The binary is rendered meaningless without the relationship of one to the other. And as Robinson's *Sartre's Worm* demonstrated, once that relationship is translated, it becomes classified by a viewer or receiver as either a recognisable pattern or a mutation (information or noise). Of course, it seems that (like the operations of the *Cloud Shape Classifier*) every pattern tends towards mutation. So, where is mutation located? Is it in between patterns, is it in the reading or viewing of the pattern, or located in a binary relationship with pattern? If indeed we are dealing with informatic ecologies that include the material of the work, the space and the viewer, then mutation occurs where it is seen; where it is read or viewed.

Figure 5. Douglas Bagnall. Still image by *Film Making Robot* (August 2004).

Mutation

Literature critic Katherine Hayles takes a similar approach to emergence, form, media and material when she suggests that the medium is a structure that is shaped and produced by its use and content (Hayles 2003, 6,33). Hayles uses emergence as both a description and methodology for our encounter with hypertextual media (Hayles 2003, 33). Hayles connects the medium with emergence through the operations of what she terms, 'flickering signification' (Hayles 1999, 46). This emergent property is tied to the work's materiality rather than its media. It is part of the experience of viewing the work. When Hayles looks at patterns and mutations in hypertext she sees patterns (such as the binary 0101) resulting in a situation whereby "any symbol can appear in any position" (Hayles 1999, 32). Problematically, this means that pattern cannot invite or contain mutation, simply more pattern. In other words, it will tend toward the periodic, and the shifting pattern of the pattern will overrule any potential mutation. The reason this may be a problem is 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" (Hayles 1999, 32-3). Mutation is thus the "bifurcation point" between pattern and randomness (Hayles 1999, 33). It is here that a system can evolve in a new direction. Once mutation occurs the pattern is never the same, and as a result, we can only understand the passing of pattern through randomness. Hayles turns the equation around (1999, 33):

> The randomness to which mutation testifies is implicit in the very idea of pattern, for only against the background of nonpattern can pattern emerge.

Pattern becomes a kind of analogical end-point, and randomness a material quality of the digital. These digital patterns (what we might term a work's code or software) do not contain an evolutionary finality. As Hayles makes clear, mutation as a process or vehicle for change puts "something else" in place (Hayles 1999, 32-3). The medium does not (and cannot) evolve, because the emergent digital relationships of pattern and mutation occurring at a material (and not a medium) level render the idea of media redundant.

The process of emergence generates new materialities that themselves contribute other potentialities for emergence within the ever-shifting viscosity of the work. In *Cloud Shape Classifier* this occurs through an emergent process that treats noise and information as the same property, and not as a movement away from noise into information. Shifting relationships between pattern and mutation move the individual classifiers of the *Cloud Shape Classifier*. The digital pattern of the viewer's selection process is the work's aesthetic. Moreover, as Hayles highlights, digital materiality and emergence are part of, and generative of, ongoing processes that do not solely trace patterns but engage levels of randomness – noise. Noise is part of an installation's relationship to its wider environment. 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 at which noise might settle. 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 and become noise. The shift is in the aesthetic parameters of the classification. Take away noise (as interruptions and decisions made by viewers) and there is not emergence, simply evolution. How does a cloud evolve? It cannot; rather

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. Instead, we continuously engage in a search for perfection.

REPETITION (REPRESENTATION & COMPOSITION)

Another of Bagnall's works does attempt to reach a point of aesthetic finality or completion in the creation of a series of short films. Like the *Cloud Shape Classifier*, the *Film-making Robot* also engages with histories of aesthetic thought. However, rather than simply suggesting visual options suitable for an individual viewer's taste, the *Film-making Robot* creates films that fit its own studies in aesthetics. The process of filmmaking is distributed between the robot's eyes, that travel the city of Wellington courtesy of Stagecoach buses, and the robot's body (mind) that is located on a networked server in a gallery. The information travels between eyes and mind through the cafenet wireless network. Each day as it travels the robot records hours of footage. It then translates this information into film. In order to construct its films, Bagnall writes (2004) that 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. In fact, all its training is based on the nature of the aesthetic experience, its technique born from repetition. Whether machinic or human, repetition establishes aesthetic criteria. Repetition as a machinic device is the key to the works discussed here and carries with it the implementation of learning as a technique (*techne*). Etymologically technique can quickly become technology (Plato 1991). In this sense, technology is not a pre-existent or inorganic material, but a process that occurs through the repetitive actions that the computer or viewer must undertake. In the case of the *Film-Making Robot* the techniques of aesthetics construct the technology of the robot. In order to be able to translate its images, the robot was trained using a selection of fine art images gathered from the web, with a majority of impressionist paintings from ibiblio (http://www.ibiblio.org/wm/paint/auth), and some contemporary and New Zealand art. It is worth noting that although many regard these aesthetic forms as compositional paradigms, they are not those of film. Secondly, a human trainer (David Hall) worked with the robot. Dividing the robot's images into sets of "good, bad and neither," he trained the robot's network to like the good ones and hate the bad ones (Bagnell 2004). 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 (Bagnell 2004). 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 recognisable as the process of editing film. Bagnall describes the dreaming process (2004):

> 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's text shows 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 (Plato 1991). 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 used Plato's story to develop his model of the cinematic apparatus (Baudry 1976). Bagnall 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” (Bagnell 2004). 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 a subjective sense of flow, repetition and potential narrative to the work. In this 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 learnt aesthetic criteria. When it shifts into the compositional mode the *Film-making Robot* has the potential to introduce new contextual combinations. It is through the compositional tools of digital translation (turning numbers into images) that the robot is able make films.

Economist and music theorist Jacques Attali has written about what he sees as a cultural shift from representation to composition (Attali 1985). In his discussion of developing economies of sound, Attali writes that composition is the result of an engaged body that operates with no predetermined code. Composition “is the individual's conquest of his own body and potentials. It is impossible without material abundance and a certain technological level, but it is not reducible to that” (Attali 1985, 135). Composition, dependant on a relationship between “material abundance” and technology is an organising force away from, what Attali terms, the “grey world of repetition” (Attali 1985, 135). Attali’s compositional model shares something with John Cage’s imperative to pay attention to sound (Cage 2004). The compositional impulse is located in the listener’s body. Is it possible that the *Film-making Robot* is actually able to approach this level of composition? That it can use its techniques as a composer to move outside of its own repetitive and representational training? And, actually become a film maker?

Attali outlines a social and cultural progression from representation to composition by way of repetition. Attali argues that representation stood autonomous within modern European music constructed under the “spectacle of harmony” (Attali 1985, 59). A direct relationship between a performer and their instrument meant that live performance fixed sound into a theatrical space. A performer would be greeted by a hushed concert hall and “the trap closed: the silence greeting the musicians was what created music and gave it an autonomous existence, a reality” (Attali 1985, 47). Live performance created an environment around the performance; it had a frame made from silence, a space of its own within which it could represent. As Attali continues (1985, 62):

> representation leads to exchange and harmony. It requires a system of measurement an autonomous value for the work and hierarchy … to make people believe in what is represented in such a system, it is necessary at a certain point to put an end to dissonance, to announce compromises. Representation thus excludes the possibility of a triumph of dissonance.

As a social and material framework, representation generated controls over the subjective experience of the music and tied it to a particular space and time – the performance in the theatre. Additionally the structures of representation repressed noise (dissonance) as the performance was spatially and temporally contained. With the advent of popular recording technologies in the Eighteenth Century, all of a sudden sound could be reproduced, and the concert hall was challenged by the spaces of the radio and the gramophone (Moholy-Nagy 2004). The replacement of representation (equated with live performance) with repetition (the result of recording) meant that ownership of the time and space of performance was no longer singular and controlled. It is the same move that Walter Benjamin saw occurring in the mechanical reproduction of the work of art, and is part of similar socio-economic changes (Benjamin 1935). Attali (Attali 1985, 106) writes that,

> The new aesthetic … excludes error, hesitation, noise. It freezes the work out of festival and the spectacle; it reconstructs it formally, manipulates it, makes it abstract perfection. … Representation communicated an energy. Repetition produces information free of noise.

Attali’s concern is with a shift from the politics of representation – a single unique performance tied to a performer – towards a politics of repetition, where a performer may not be the recording artist, and where the repetition of sounds can change patterns of ownership. In both cases noise is excluded, whether as disturbance within the space of the performance (dissonance), or error in the performance itself (information free of noise). Under the structure of repetition, the listener can own or retain the performance in a way not possible within the structures of a concert hall, and maintain an illusion of perfection and repeatability.

As a mechanical device that both receives the information (the viewer or listener in the concert hall, 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 inhabit both frameworks. The images the robot reads are representational, and thus should exclude noise – it is after all selecting the images it 'likes'. The robot's (digital) nature also means that its actions should equate with those of information processing and potentially create information freed from noise. However, it does not. As a digital reproduction of a film maker the technology of the robot repetitively introduces and works with noise and dissonance. The digital creation of the work, and the reception of it within the gallery or online, distributes the social and cultural frameworks of representation. As a result, not only the recording of the work but the aesthetic experience of it has mutated to include noise.

For Attali, the technologies of repetition lead to a form of mutation where the production and reception of aesthetic information become separated from the human subject. The major impact of this he attributed to reproduction, and the "stockpiling of time" (Attali 1985, 101).

> Repetition constitutes an extraordinary mutation of the relation to human production. … it makes the stockpiling of time possible.

The *Film-making Robot* turns this mutation into a positive. It develops a potential space where the aesthetic experience is not tied to the singular experience of the concert hall or movie theatre, nor the repetitive recording of the video or DVD, but where the aesthetic experience is generative and relational. The relationship to human production is mutated but it is also enhanced. The *Film-making Robot* effects this change because it not only includes noise within its aesthetic criteria, but because it stockpiles time. In fact, both the *Cloud Shape Classifier* and the *Film-making Robot* stockpile time. The experience of both works shifts from a remembered (or recorded) event full of glitches and stammering, to a distributed recording (or collection), able to be manipulated on demand forever. The *Film-making Robot* creates finished dated films that are available for online viewing and download. This is the output of the work, rather than the work itself. In the process of making films the *Film-making Robot* stockpiles time and eliminates any fixed representational or perceptual authority. As soon as the *Film-making Robot* goes out on the streets the presence of noise means that repetition is impossible.

Think back for a minute to Claude Shannon's model of information transmission (Shannon 1948). 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*.

The structures of representation and repetition limit possibilities for composition because they are not informational and exclude noise. The viewer or listener is passive and unable to introduce his or her own information. Harmony (the sonic equivalence to beauty) is the final tool of control and order within the structures of representation. Designed in such a way to imbue 'meaning' to the listening masses, harmony is generally understood by how it feels (its aesthetic). Benjamin saw cinema as a tool for the masses. Through the apparatus and technologies of filmic reproduction the audience is formed (Benjamin 1935). Read together Attali and Benjamin locate an audio and visual congruence where the elimination of noise through harmony and passivity means that representation overlaps with repetition, and composition is the power of aesthetic control. This then returns us to the paradox of the *Film-making Robot*: is the robot able to compose or does it merely represent and repeat?

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 practice. It is more than a performer within the representational structures discussed by Attali, and more than Benjamin's screening apparatus for pre-recorded images. The robot stockpiles time and transmits noise. In this it composes. The *Film-making Robot* makes films because it engages with the digital materials of time and noise, in order to generate works that viewers experience either online or within

a gallery. The robot composes films within an aesthetic ecology that includes relationships between information and noise, maintained by structures of pattern and mutation.

MUTABLE AESTHETICS

The *Film-making Robot* makes films by engaging the digital materials of time, information and noise. The finished films are experienced by viewers either online or within a gallery. The *Cloud Shape Classifier* also works with learnt patterns of information and noise as it analyses and selects the "good" images of clouds for its viewers. In the recasting of everything as digital have these two digital installations effected some form of representational change? Within the ecology of film making and reception, the *Film-making Robot* efficiently distributes the functions and properties of film making in such a way that it is possible for unique films to be composed within a single 24hr period. Similarly, the *Cloud Shape Classifier* uses aesthetic criteria to shift the fixed properties of media. The relationships between translation and pattern in both works raise uncertainties about media and materials. Both works also suggest an open concept of the work, viewer and space; suggesting an environment where a human or machinic viewer does not only enter a space in which a work is screened but constructs the work and the space for others. In this, both works do contribute to a form of representational change. However, there are greater implications for our concepts of media. 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 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.

Both works conduct operations that enable them 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* is able to compose films. The *Cloud Shape Classifier* can anticipate aesthetic choices of its viewers. Gilles Deleuze has argued that the process of perception is one of "relating each concept to variables that explain its mutations" (Deleuze 1990, 31). The terms are not merely coincidental. Mutation and repetition are two material processes that, like Cage and Attali suggest, force us to pay attention to noise. One term explains and interacts with the other. Deleuze explains that "perception is not the object plus something, but the object minus something, minus everything that does not interest us" (Deleuze 1990, 25). Deleuze's selective and relational process of perception parallels the process Shannon anticipated for information transmission and reception. It is also the process shared by the robot, the classifier, and the viewer as they assess the images before them. Perception is interactive and complex as the viewer distinguishes between information and noise.

This returns us to the role of translation and coding. 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. In this the works are not doing anything 'new'. Peter Robinson's digital image *Sartre's Worm* highlighted the difficulties of translation, whether across cultural percepts or linguistic codes. Readings of his work demonstrated the assumed relationships of digital code to purity and universality. As this discussion has shown there is no such thing as pure information, or pure code. Translation and information – like viewing and thus like all aesthetics – is subjective. Perception is no longer a simple one-way view out from a subject, but in a more nuanced sense, evokes "a vibration gathered by a receptive organ" (Deleuze 1992, 95). Elsewhere, Deleuze writes that "When we perceive, we contract millions of vibrations or elementary shocks into a felt quality" (Deleuze 1988, 87). For both the human and the machine, perception is vibration. The essence of sensation (or aesthetic experience) is rhythm, a vibration between figure and field. Vibration travels without direction, it has movement and duration. Vibration is both sound and noise; it brings together time and space. Perception is the awakening of its tendencies.

To invoke digital media also takes me back to the materiality 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 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. Information contains noise, meaning that no 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" (Brennan 2002, 2). For the visual digital image the pixel can be

considered the final frontier. No matter how small it gets, the only limitation is a fixed resolution. The pixel is a determining aspect of the visual experience of the installation. Backed up by constant "anti-aliasing and dithering of the real" the digital visual image is not only determined by, but is defined by the pixel (Brereton 1997, 30).

Historically, the media specific divisions of aesthetic criteria depended on the division of space and time. In bringing time and space together the *Film-making Robot* and the *Cloud Shape Classifier* question the establishment of material boundaries between media, and thus the very notion of media. Both works stockpile time, and in so doing, bring time into the space of the gallery. 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 only the final result of its gaze. As the *Film-making Robot* travels it encounters both information and noise. Using its rudimentary training in compositional aesthetics the robot makes editorial decisions, deciding between noise and information, adopting the role of noisy auteur. When we watch a film made by the *Film-making Robot* what we are seeing is a film of vibrating perceptive decisions based not on aesthetics but on the flickering on and off of the noise of the digital. (It is pixels all the way down.)

To conclude this discussion I want to return to Steven Johnson's comment about emergence cited earlier (Johnson 2001). In his text Johnson is interested in the ways that interactive distributed and networked systems such as *Slashdot* shift the role of the online user. He writes that "to understand how these new media experiences work, you have to analyse the message, the medium and the rules" (Johnson 2001, 158). Johnson argues that a notion of emergence is key to this analysis, as it is both a property and a system embedded within the medium, and the rules. He continues (Johnson 2001, 158):

> What's interesting here is not just the medium, but rather the rules that govern what gets selected and what doesn't. It's an algorithmic problem, then, and not a representational one.

Bagnall's works utilise algorithmic problems and turn them into aesthetic (but not representational) ones. As a result, the operations of information and aesthetics are found to be very similar. This is because both operate within media ecologies outside of fixed notions of media. Throughout this paper I implicitly address the limitations (as I see them) of art history's embrace of media-specificity. I have suggested instead that a more open approach to aesthetics and information determines not only the viewer's approach to the medium but also what in fact that medium 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; as media at all. Instead these works suggest that we consider how digital media form provisionally from emergent materials.

Debates around aesthetics, and the control or expectations of aesthetics as a personal definition or experience, are about how a work takes the viewer inside of his or herself, (beauty) or conversely allows the viewer to move outside of his or herself (sublime). Of course, this is traditionally what watching clouds does. Clouds move, thus they occupy time. In this, they share much with digital installation and moving image. Time is what is lacking for the viewer of clouds, so generously the *Cloud Shape Classifier* offers a method to introduce time as a material to the classification/ aesthetic system. The cloud becomes both a media and a material for the installation. Through its enforced material distribution, the *Film-making Robot* is able to activate the aesthetic grounds of cinema. The robot conflates both the representational apparatus for viewing, and the repetitive apparatus for recording into the mobilized body of the auteur. Furthermore, in the material distribution of the *Cloud Shape Classifier* and the *Film-making Robot* notions of space and installation as determined by a gallery environment are opened up to questioning by both informatic and aesthetic systems.

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