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Title Page

The Sublime in Interactive Digital Installation:

An analysis of three artworks: *Listening Post*, *Translator II: Grower* and *The Cloud Harp*

A Research Report submitted to the University of the Witwatersrand School of Arts.

In partial fulfilment of the requirements for the Degree of Masters of Art.

Tegan Bristow

January 2007

Supervised by

Christo Doherty

Declaration Page

I declare that this is my own unaided work. It is submitted for the degree of Master of Arts at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree of examination in any other university.

Tegan Bristow
January 2007

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Abstract

The Sublime in Interactive Digital Installation:

An analysis of three artworks: *Listening Post*, *Translator II: Grower* and *The Cloud Harp*

This examines the notion of the sublime in interactive digital installation art, with the primary aim of showing the methods and devices used to evoke the sublime through interactive digital installation. The evocation of the sublime which is largely associated with nature is an appealing aesthetic in these technology driven artworks. This paper follows the history of the notion of the sublime in the arts and philosophy from Dioynisus Longinus to Jean-François Lyotard, with an emphasis on Romanticism and Postmodernism. Three case studies of interactive digital installations art are presented and addressed: Ben Rubin and Mark Hansen's *Listening Post* (2001-2003), Sabrina Raaf's *Translator II: Grower* (2004) and the NXIO GESTATIO Design Lab's *The Cloud Harp* (1997). These are addressed not only in regards to the histories of the notion but to a contemporary adaptation of the notion, influenced by the technology age and the Postmodern sentiments of Jean Francois Lyotard.

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Introduction

Interaction design is fundamental to any digitally interactive artwork. Interaction design not only dictates the type of interaction experienced but supports successful communication between the participant and the artwork. The 'participant' is what in the arts is traditionally referred to as the 'viewer' and in communication technologies as the 'user'. In interactive digital art, the participant is both viewer and user. Interactive art works are designed for a participant, who both contributes to and draws meaning from the interactive art work. It is therefore necessary that this introduction start with a brief description of some forms of interaction design. One of these will be explored further in this thesis to show how interaction design can be used successfully to evoke the sublime in the participant as subject.

I here identify four basic forms of interaction design that contribute to understanding the essence of digitally interactive art.

The first is web-based interaction design. In this form the participant interacts remotely, using the Internet as the communication medium. The participant in this form interacts through a computer terminal, with a programmatic art work and remotely-situated data that exists on a server. The participant may also interact with other remotely-located participants through the same means of communication.

Screen-based interaction design is the second form. Here the participant or participants interact with localised programmatic art works and data located on a computer terminal that is not a remote server.

The third form is installation-based interaction design. This engages participants through their presence and behaviour rather than through a terminal, where the input devices are usually sensors rather than traditional input devices such as a keyboard and mouse.

The fourth kind, which I will address further in this thesis, is technically the same as the third form but is not necessarily designed to engage participants through their behaviour or inputs. Rather, this installation-based form uses information from its immediate or local environment, rather than the participant, to mediate the art work. This last form is often referred to as 'environmental' interaction design. In art works of this nature, user participation is secondary and the participant's task is to simply interpret the installation, its function and concept, through an experience with the environment and digitally interactive art work.

I have specifically chosen to address this fourth form of interaction design because art works of this nature more often than not source data in real-time from phenomena in their immediate and surrounding environment. I will address, in this form of interaction design, art works that draw data directly from 'local' phenomena that are natural rather than human-generated. I explore specifically how the inclusion of data from natural phenomena has the potential to evoke sentiments of the notion of the sublime.

It is for this reason that in this thesis I will explore further the notion of the sublime in philosophical writing, in the arts and in certain instances of technology. This exploration will assist in addressing the evocation the sublime through interactive digital art works and in particular those that use data sourced in real-time from natural phenomena.

The sublime, according to Cosgrove, is a notion that is understood in the arts to convey that which is un-representable, and is regarded as being powerfully associated with transpersonal awe enriched by the presence of nature. It is this definition that is addressed in this thesis. Yet the word 'sublime' is used in English to describe almost anything that is "of the most lofty or [has an] exalted nature… inspiring awe, unparallel [or] outstanding." (Cassell Concise English Dictionary). According to Cosgroves definition that these popular definitions of the word 'sublime' are derived from 'the sublime' as a notion representing an aesthetic category of European eighteenth-century Romanticism.

Romanticism was a movement that began in the mid-eighteenth century and continued into the late nineteenth century. This movement began in philosophical writing, where it was referred to as 'Idealism'. It was regarded as a philosophical reaction to an ever-increasing reliance on reason in the empirical investigations into man's personality and life, popular in Europe – particularly Germany and France – at the time (Barnes 871). The rise of empirical thought in this period supported the idea that man's intellectual abilities, especially as reflected in science, could be used to expose fundamental truths about our mysterious reality. Traditional and sentimental thinkers of the time opposed this idea, believing that it undermined any religious and emotional emphasis of the theories of life. In the arts, a sentimental reaction appeared along with philosophical Idealism and is historically labeled 'Romanticism' (Barnes 872).

In Romanticism, the notion of the sublime held a prominent place as an aesthetic category. The notion came to reflect the importance of the metaphysical and transcendental found through experiences with and in nature. The notion was also regarded as a concept that proved the relevance of ethics derived from transcendental experiences (Cosgrove).

The Romantic Movement did not last long, however. As history shows us, it was not sufficiently strong to curb the force of the empirical sciences that accompanied Modernism, nor did it continue as a relevant aesthetic category in the arts. Barnes states it was not until after the the two World Wars that a vaguely similar intellectual response appeared in the arts, including literature. Barnes does not define or label this response, but points out that it was a fundamental and religious reaction and was not prominent enough to make any changes in empirically-influenced modern thinking. Yet in the mid-twentieth century we see the notion of the sublime as an aesthetic category raise its head, and this time more fiercely, in the philosophical work of Jean Francios Lyotard (1924 – 1998) titled The Postmodern Condition: A Report on Knowledge (1979). This text is a study of the state of knowledge in the twentieth century. The work was commissioned by the Quebec *Conseil des Universites* in Canada, to frame the discussion of incorporating computers into higher education (Malpas). A Report on Knowledge is an extensive study on the state of communication technologies and their socio-economic effects in the world in the 1970s. The report negatively portrays both the Enlightenment and the rise of empiricism as the faults of Modernism. We find in this and other philosophical writings by Lyotard on Postmodernism that the notion of the sublime as an aesthetic category is again fully engaged as a device to highlight a form of moral transendance. In Lyotard's writing it is reviewed as a Postmodern device, which we will explore further along with Romanticism and even earlier origins of the notion to better understand the concept in the first chapter of this thesis.

Despite the short life of Romanticism, the Modernist and Postmodernist notion of the sublime is firmly grounded in it. The notion has remained an aesthetic category that has been periodically explored in the arts, architecture and even in the evolution of technologies. In Romanticism the notion of the sublime appeared as distinct from the notion of beauty, which represented perfect forms, balance and

harmony. The notion of the sublime, in contrast, represented that which evokes simultaneously awe-inspiring pleasure and the possibility of mortal pain. It was understood to be a notion that spoke to humanity's ability to transcend the physical, relying on emotion and feeling to expose what was regarded as divine truth[1].

When addressing the notion of the sublime in regard to the three case studies that I present in this thesis, the following four questions arise:

- Firstly, how is the notion of the sublime understood in this age of technology?
- Secondly, how does a contemporary understanding of the sublime engage with the notion's Romantic associations to nature?
- Thirdly, as an aesthetic category associated with the presence of natural phenomena in Romantisim, how does nature appear in digitally interactive art works that use data sourced from natural phenomena?
- And lastly, do these technological art works – in their technical functioning and use of subject – successfully evoke the sublime for the participant and, if so, how?

By answering these four questions in the arguments of this thesis, I will show not only the potential for the successful evocation of the sublime in the participant in digitally interactive art works, but also a re-articulation of the notion of the sublime as an aesthetic category existing in the space between techology and natural phenomena. An exploration of the interaction design of each case study will show a form of art that reflects a change in how the notion of the sublime is evoked in the viewer. A new form that differs greatly in style and associated meaning to the Romantic and Modernist attributions of the notion.

[1] A Romantic definition derived from both Cosgrove and Kant.

It is important to note that I do not address these questions in the bulleted order in which they are presented above. I have chosen to answer the questions through thematic chapters that address the popular definitions and categories within which the questions can be asked; these categories include Land Art in Modernism and Artificial Life studies in Postmodernism. The chapters of this thesis form a history of the notion of the sublime, one that is clearly centred on Romanticism, but extends before and beyond this historical movement. In the last chapters of the thesis, I present three case studies that are analysed with respect to the notion as it is understood in a contemporary cultural context.

The discussions of this thesis are laid out as follows:

- Chapter one, "A Shifting Notion" sets out the notion of the sublime as a concept and begins to address its origins and shifting history. This is done to establish an understanding of the notion in a contemporary context.
- In Chapter two, "The Animate and the Natural", I show how the aesthetic appreciation of nature, which is strongly associated with the notion of the sublime in Romanticism, is influenced by science and technology. In this same chapter I enumerate the pitfalls of the computerised emulation of nature through technological and digital techniques.
- In Chapter three, "Data Visualisation Art and the Sublime", I explore the idea of the 'anti-sublime' in data visualisation art, a term coined by contemporary New Media Art theorist Lev Manovich. In this chapter, too, I begin to emphasise the importance of a sensitive use of technology, by investigating Matthew Ostrowski's interpretation of Mark Hansen and Ben Rubin's *Listening Post* (2001-2003).
- In Chapter four, "Case Studies", I introduce the next two case studies: Sabrina Raaf's *Translator II: Grower* (2004) and the NXIO GESTATIO Design Lab's *The Cloud Harp* (1997). In discussing these two case studies, I make a clear distinction between the two works by approaching

them in different sections. These address the unique evocative qualities of their specific to their interaction designs.

Through the case studies I attempt to show, with reference to the discussion in the first three chapters, how emotions and conceptualisations associated with the notion of the sublime can be evoked in a participant as subject through digitally interactive installation. This discussion not only includes associated Romantic ideas, but a version of the notion identified as Postmodern by Lyotard. This also includes the insights of the young American artist and theorist, Emily Lutzker, who is highly influenced by Lyotard.

My overall aim in this thesis is to show how the intention to create digitally interactive art work that can evoke the notion of the sublime is needed in a technology-driven age. Technology is understood by Lyotard as the site of proof, efficiency, progress and, in turn, terror. The technologies, due to their origins in reason and empiricism, generally disregard any form of personal or divine transcendental experience. On the other hand, the evocation of the sublime through these digitally interactive works shows a sensitive and successful use of technology, able to overcome the rigid rationalism inherent in technology as a medium.

Chapter 1: A Shifting Notion

Let us consider the major shifts in the meaning and attributions associated with the notion of the sublime. This should help us understand the notion.

The notion of the sublime has a shifting history extending over more than four centuries, yet the notion has over this time predominantly retained a meaning that alludes to the un-representable. It is an aesthetic category that refers to divinity and the knowledge attained through transcendental experience. For this reason it has been addressed by philosophy and the arts in a number of culturally historical movements. Given the context of this thesis, I have chosen to focus largley on the notion as it appears in the visual arts and as we shall see, this history is more often than not guided by both philosophical and socio-political movements.

As a brief introduction to this chapter, I address the notion's known origins in the Greek text of Peri Hupsous an author also known by the name of *Dioynisus Longinus*[2]. Then I examine more specifically the evocation of the sublime through painting; through the discourses of the Neo-Classical and then the Romantic painting traditions. The discussion on Romanticism, which makes up a central part of this history, includes the vital influence of philosophers Edmond Burke (1729 -1797) and Immanuel Kant (1724 -1804). I then move to the New World (North America) and address the manner in which the notion of the sublime is borrowed and adapted from its use in European Romanticism to became aligned with natural phenomena and more importantly progress in North America[3]. After this I give an account of how

[2] As in Dioynisus Longinus on the Sublime Smith (1739).

[3] The line of thought on the notion of the sublime in North America, is predominantly drawn from the text American Technological Sublime by David E. Nye. 1994.

philosopher Jean François Lyotard addresses the notion with regard to the art and science in Modernism and Postmodernism.

The shifting history of the notion of the sublime, apart from deepening an an understanding of the notion, specifically contributes to its contemporary meaning and is therefore beneficial when addressing the current understanding of the notion as it applies to the case studies of this thesis. This approach also demonstrates that applying to contemporary digital art works presented as case studies only one of the historical notions discussed, would be to neglect the value of the notions cultural context. It is also important to acknowledge, through this history, that the Romantic definition of the sublime continues to act as the foundation for understanding the notion of the sublime in Modernism and Postmodernism.

Origins in the Longinian Tradition

According to S. H. Monk in The Sublime: A study of critical theories in XVII-Century England (1960), the concept was introduced into the English school, also known as The Royal Academy, from the academic theory of Neo-Classicism in the French and Italian schools of art. In Neo-Classicism, the sublime represented an ideal aesthetic of the loftiest and greatest quality achievable in the arts. It also encompassed what was understood to be an ideal state of mind, which in this tradition represented the potential for humanity to transcend the physical through intellectual thought. The Neo-Classical interpretation through it's adoption into the English School shifted over the eighteenth century, to be associated more with raw emotional response than an intellectual prowess. This change was a direct influence of the reactionary movement Romanticism. Originating in Idealism, as previously mentioned, this was a reaction to the extensive and popular debate on aesthetics,

ethics and reason that began in Western Europe (dominant in Germany) in the early part of seventeenth century as part of the Enlightenment.

In plotting the history of the sublime, it is important briefly to explore how the notion came to Neo-Classicism and how it was understood there. It has already been noted that the Neo-Classical concept of the sublime was drawn from the text of Greek author Dioynisus Longinus. Longinus's text, translated into English by Smith, is known as Dioynisus Longinus On the Sublime (1739), and was highly influential in the formation of Neo-Classical aesthetic ideals. Peter de Bolla, in Discourses of the Sublime: Readings in History, Aesthetics and the Subject (1989) explains that Longinus regarded the sublime as being strongly linked to evocative oration and excellent composition in language, to quote "a perfection and eloquence in language". De Bolla explains, that the sublime was a natural god-given gift possessed by only the greatest of writers and orators who had the ability to transport an audience's emotions to great heights. According to De Bolla this gift, translated as sublime, was seen to be the manifestation of true genius, for Longinus this proved humanity's aptitude for greatness which was associated with godliness. This true genius was understood as the manifestaion of the gods on earth and from this derives the original meaning of sublime and it's assocation with the devine.

De Bolla's view is that it is this aptitude for greatness in man identified by Longinus through the notion of the sublime, that was a direct influence on the Neo-Classical tradition in its attampt to show the greatness of humanity through painting. This influence however manifests, as we shall see, in a number of ways, a good example of this is the use of metaphor. The style of the Longinian text makes frequent use of nature as a metaphor for man's excellent and wonderful attributes – or godliness as it were – and it is additionally belived by De Bolla that this style influenced the appearance of scenic grandeur as a metaphor in Neo-Classical

painting. The following from Smith's translation shows nature as a metaphor for transcendental greatness as an inherent quality in man:

> Let anyone take an exact survey of life, which, in its every scene, is conspicuous on account of excellence, grandeur, and beauty, and he will soon discern for what noble ends we were born. Thus the impulse of nature inclines us to admire, not a clear transparent rivulet that ministers to our necessities, but the Nile, the Ister, the Rhine, or still much more, the oceans. We are never surprised at the sight of a small fire that burns clear, and blazes out in our own private hearth, but view with amaze the celestial fires...

As we can see, according to Longinus this inherent greatness manifests were humanity feels excessive emotion as an impetus to achieving greater things.

The concept of the sublime in Neo-Classicism was not taken directly from the Longinian version, but adapted to suit Neo-Classical ideals, which were based on a new form of Humanism, also borrowed from the ancients. This fusion of ideas was instigated by a call for a return to reason and morality in art. This trend appeared in the seventeenth century predominantely in France, but also in Italy. The call for reason saw a nostalgic revisit to both Classical and Renaissance ideals. We can understand that it was under this influence that the notion of the sublime came to represent the intellectual superiority of man, yet it is only the intellect rather than the divine gift of natural genius and the ability to transport an audience that was emphasized in Neo Classicism.

The Neo-Classical Notion in the Arts

The Neo-Classic standpoint for the visual arts relied on establishing specific formulae of depiction within painting. These rules applied to classically heroic and epic scenes that were regarded as reflecting the sublime, in which humanity would be represented in its capacity for greatness. The formulae included precise rules for the reproduction of natural scenery, architecture and the human figure. Monk's discussion on the sublime in painting, maintains that Neo-Classical artists were expected always to represent humanity and its divine allegorical relationship to nature. He goes on to state that, with the need for the epic and humane arising from Renaissance humanism, Neo-Classical aesthetic theory also favoured the style of the Renaissance artists and much of the formal approach to painting is influenced by both the Renaissance and the need to express the so called 'sublime' inhernt in man.

An example of the type of influence exercised by the Renaissance can be seen, for example, in the painting by Pietro Perugino: *Christ giving St Peter the Keys to the Kingdom of Heaven* (Fig.1). This 1482 fresco in the Vatican depicts the social environment of a city and its relationship to nature. The city is shown as a formal and geometrical order that represents only harmony and proportion, representing a higher intellectualism.

The Longinus text on the sublime seems to have been mostly influential in the Neo-Classicist attempt to allude to the notion of the sublime as expressible through higher intellectualism in painting. The following are attributes ascribed to the notion of the sublime by Longinus and borrowed by the Neo-Classicists. These are related by Smith:



Fig. 1. Pietro Perugino. *Christ giving St Peter the Keys to the Kingdom of Heaven*. 1482. Fresco, 335 by 550 cm. Cappella Sistina, Vatican.

> The first and most excellent of these is a boldness and ***Grandeur in the Thoughts***. … The second is called the ***Pathetic***, or the power of raising the passions to a violent and even enthusiastic degree;
>
> …and these two being genuine constituents of the *Sublime*, are the gifts of nature, whereas the other sorts depend in some measure upon art.

Another three aspects of the Neo-Classical adaptations of the notion are more generalised by Smith:

> The third consists in a skillful application of figures, which are two-fold of sentiment and language.
>
> …The fourth is a noble and graceful manner of expression…
>
> …The fifth source of the sublime, which completes all the preceding, is structure or composition of all the periods, all possible dignity and grandeur.

Monk, in the same vein, describes how Neo-Classicists favoured Raphael as a painter. Monk describes Raphael as "succeeding in representing in the most graceful manner the figure's attitude of sublimity" (165). Raphael's generalising and idealising of nature was also deemed "beautiful and the beautiful the sublime and wonderful" by Roger de Piles in his 1716 Art of Painting[4]. His figures were regarded as being of great nobility in thought and pose, and his representation of nature a perfect idealisation of parts, where the idealisation – not the composition – reflected the notion of the sublime. Monk goes on to describe the presentation of the notion of the sublime in painting:

[4] The Sublime: A reader in British Eighteenth-Century Aesthetic Theory (1996).

> Sublimity comes into painting through the idealising of nature which is the business of serious artists to accomplish; it consists in a heightening, a selection of great details from many objects and a combining of them into one perfect whole. The mere copying of nature can never produce sublimity…. An exalted idea … goes beyond nature itself and treats more perfect forms than can be found. (178)

As Monk explains, nature was thought to be imperfect in relation to the capabilities of man, and it was thought to be the role of the Neo-Classical artist to perfect her "imperfectly fulfilled intentions" (Monk 178).

A case in point would be Jacques Louis David, who was held in high regard for the perfections reflected in his paintings and provides an example of late French Neo-Classical painting. The 1784 *Oath of the Horatii* (Fig.2) immediately shows the Neo-Classicists' obsession with the ancients. The reference to classical subject matter in this painting was part of the humanising campaign, which was greatly influential in the birth of the French Revolution. In some senses it could be argued that the French Revolution was the social and political outcome of the Neo-Classical movement (Monk, 179). In the arts it marked a change from the frivolity of the Rococo style, popular with the aristocracy of the time, to painting that could reflect the birth and ideals of a new Republic - where the notion of the sublime was used to portray the integrity of the movement.



Fig. 2. Jacques Louis David. *Oath of the Horatii.* 1784. Oil on canvas, 330 by 425 cm. Musée du Louvre, Paris.

The Romantic Sublime

The use of the Sublime as an aesthetic category in Romantisism was most prevalent in England. Monk points out that it was the appointment of Sir Joshua Reynolds (1723 – 1792)[5] as President of the Royal Academy and the delivery of his seven Discourses between 1769 and 1790 that effectively changed the direction of the notion of the sublime in the arts. The period in which Reynolds gave his Discourses also saw a new development in philosophy, namely Idealism – seen predominantly in England and Germany. And as mentioned previosly the parallel development in the arts is referred to as Romanticism, and it is in Romantisim that the notion of the sublime began to shift from a notion reflecting Neo-Classical ideals to one that could be called the Romantic sublime.

Monk aptly maps this shift as moving from a notion oriented around 'Grandeur in Thoughts' to a notion focused on "the power of raising the passions to a violent and even enthusiastic degree" (in the words of Longinus). It is also marked by Monk as a change in academic fashion in the Renaissance artists shifting from the objectivity of Raphael to the subjectivity of Michelangelo. This is seen as a shift in emphasis from a formalised intellectual approach in painting to an approach that was inspired by emotive expression, reflecting a relationship between man, his passions and nature. The shift in the notion of the sublime in the arts is seen by Monk to be a shift from an elitist rhetoric to a way of making and viewing art that fitted the wants of the new literate middle class that arose during the Enlightenment. This rising class was inclined towards the emotive and everyday rather than towards classical humanism. Alongside the emergence of a literate middle class was a brand of empirical thought that began to lay bare things that were previously regarded as

[5] Sir Joshua Reynolds was one of the founders and the first president of the Royal Academy. The Royal Academy was established in 1768 as an opposition to the Royal Society of the Arts in England.

unexplained. This included the relationship between man and nature, which quickly became a matter for contention amoungst artists, philosophers, and the literate public.

During this period at the Royal Academy, as happened with the Neo-Classists, Reynolds's arguments mostly concerned the techniques of painting. Yet a new interest in techniques for evocative rather than formal representation emphasised a change in attitude towards nature, and in turn a change in the sentiments associated with the sublime. Painting was no longer required to perfect nature as an idealisation of parts, but rather to represent some of nature's ability to evoke splendour and terror. Here the subjective approach of Michelangelo was seen to show the individual soul: a mystical and, in turn, emotional point of view. His expressive style is evident in the ceilings of the sistine chapel where a emotive anti-frormalism is witnesed in comparison to the work of Raphel.

Classical subject matter was discarded for of Romantic Idealism. The agenda of the Romantics was to retain a metaphysical rather than a strictly formalistic understanding of nature and her relationship with man. In this way Romanticism found solace in the mystical and transcendental as an opposition to the rise in capitalist empirical interests that were changing society and older relationships to land use (Cosgrove).

In this period the philosopher and social critic Edmund Burke's 1756 A Philosophical Enquiry into the Origin of our Ideas of the Sublime and Beautiful, became a central work reflecting the shift in the notion of the sublime and highly influenced the changes in techniques of art making. Burke's Enquiry was written as a form of philosophical writing at a time when philosophical writing focused on the principles of understanding aesthetic experience with regard to human behaviour. In

this tradition, Burke makes an enquiry into the sublime and the beautiful, as the title suggests. J.T. Boulton in Burke's Enquiry into the Sublime and the Beautiful (1958), describes Burke as writing from the viewpoint of a 'sensationist', claiming that:

> [For Burke,] sense experience is primary and the function of judgement is to evaluate the "various relations" between the original in nature and the responses it evokes there, and its appearance and effect in art. (xxxvii)

Burke says of his own work in the preface of the first edition:

> A remedy…from a diligent examination of our passions in our breasts; from a careful survey of the properties of things which we find by experience to influence these passions; and from sober and attentive investigation of the laws of nature by which these properties are capable of affecting the body, and this exciting our passions. If this would be done, it was imagined that the rules deduced from such an enquiry might be applied to the imitative arts, and to whatever else they concerned, without much difficulty. (i)

Burke dealt with the sublime and the beautiful in one enquiry, as both were considered emotional responses evoked by nature and its representation. Burke did however clearly separate the idea of the sublime from that of the beautiful. The notion of beauty, according to Burke, was associated with a social consensus of things that evoke pleasure (such as spring flowers), perfect form or a splendid view; Burke described the pleasure derived from beauty as being of "…a positive and independent nature". The sublime on the other hand, Burke described as deriving its pleasure "from a diminuition of pain". Burke's intepretation of the sublime was associated less with the qualities of human greatness adopted in the tradition of the Neo-Classicists than with the human 'passions'. Burke's idea of the sublime is

associated with emotive intensity and feeling as found in the Longinian tradition. Boulton suggests the following elaboration of Burke's definition:

> [In Burke]…a constant interest in the irrational response to art and life, the kind of response that is natural and not at all under the control of the analytical reason. (xl)

The passions associated with the notion of the sublime, Burke argued, are evoked particularly as a reaction to great and vast phenomena in nature, and are strongly associated with the emotions of terror and astonishment. These emotions he regarded as being inspired by vast objects such as mountains, high precipices, wild storms and the cosmos.

More importantly, as Cosgrove points out, despite this major shift towards evocative experience and vast objects, the most distinct difference between the Burkian philosophy and the Neo-Classical notion is a complete inversion of the the source of the sublime. Burke removed the source of the sublime from greatness shown by the orator in the Longinian tradition, or the representation of greatness of man in the Neo-Clasical tradition, and attributes the sublime to a reaction residing in the human observer (Cosgrove 228). Burke states the following in this regard:

> The mind is so entirely filled with its object, that it cannot entertain any other, nor by consequence reason on that object which employs it. Hence raises the great power of the sublime, that, far from being produced by them, it anticipates our reasoning, and hurries us on by irresistible force. (63)

The idea of the sublime residing in the human observer remains dominant to this day. Boulton states the following:

> Burke's theory of the sublime stands, indeed, not only as a daring adventure in philosophy, but also a powerful expression of a certain mode of feeling. It provided the eighteenth century [its] most spirited exploration of a range of emotional stimuli which, in the previous two centuries, had been largely the province of tragedy. (lix)

Burke's work is very much a product of empiricism, which was understood to be a project of defining reason and the definition of what reason was not (Nye 5). It is interesting to note at this stage of the discussion, though perhaps obtuse, that 'sublimation' is still used as a scientific term, and is derived from the alchemists' use of the word. To the alchemists, 'sublimation' was a process of refinig a substance and was seen to affect the spirit directly and to reveal hidden knowledge[6]. Burke in his Enquiry, as a text written at a time when much of science was indistinguishable from alchemy and yet where there is a stong motion away from the so called mysitcal unkonwn, attempts to define the sublime as an emotion evoked by external causes and under specific criteria.

Burke ascribes passions to the sublime, and ascribes a number of distinct attributes of the sublime to a plethora of objects, both natural and constructed, which could be expected to evoke the sublime in what he describes as, "the brief suspension of reason in the observer":

[6] Nye points out that in both the Longinian and Burkian descriptions, the word 'sublime' is treated as a noun. He states that it is seldom recognised that, in the periods between Longinius and the Romantics, the word was used as a verb by alchemists it meant to act upon a substance to produce a refined product. The process of converting a substance to vapour by heating and cooling it to refine it was referred to as 'sublimation'.

[Of the passion ***Terror***]…No passion so effectively robs the mind of all its powers of acting and reasoning as fear. . . it operates in a manner that resembles actual pain. (63)

Of the attribute ***Obscurity***: … we know the full extent of any danger, only when we can accustom our eyes. (65)

[The parts of obscurity are the attributes] ***Light*** and ***Darkness***, which when used in art and architecture create the effect of greatness and awe. (65)

On the attribute of ***Power*:** … Besides those things which *directly* suggest the idea of danger, those which produce a similar effect from mechanical cause, I know of nothing sublime which is not some modification of power. (71)

On the attribute ***Privation:*** All general privations are great, because they are all terrible; ***Vacuity, Darkness, Solitude****,* and ***Silence****.* (79)

On the attribute of ***Vastness:*** Greatness of dimension, is a powerful cause of the sublime…Extension either in length, height or depth. (79)

On the attribute ***Infinity***… there are scarce any things which can become objects of our senses that are really and in their own nature infinite. But the eye not being able to perceive the bounds of many things, they seem to be infinite, and produce the same effects. (80)

Succession and Uniformity … succession and uniformity of parts are what constitute the artificial infinite. (83)

This list continues to include, "Magnitude in ***Building***", "***Infinity*** in pleasing ***Objects***", "***Difficulty***", "***Magnificence***", "Light in ***Building***", "***Colour***", "***Sound*** and ***Loudness***", "***Suddenness***", "The cries of ***Animals***" and "***Feeling. Pain***". (84 – 92)

The change in the source of the sublime, now being rooted in the observer, was also reflected in the arts[7]. The English painters Henry Fuseli and George Stubbs were thought to have achieved the evocation of the sublime through "boiling clouds, precipice chasms and rocky clefted caves" (Cosgrove 228). It was understood that painting, through the eye, could embody human experience (Cosgrove 229). This was possible through the engagement of memory and nostalgia. For this reason there was a move in painting towards emotive scenes and depictions of wild nature. Epic scenes were drawn from local popular literature and poetry, such as James McPherson's epic poems of Ossian[8], and no longer from the classics. As Cosgrove states, landscape and scenery served as a mirror of human emotion and even action. The Romantics continued to use, as did the Neo-Classicists, the notion of the sublime as an aesthetic category to reflect the human condition, even though the emphasis and source had shifted greatly.

In Romantic painting; the evocation of the sublime became an issue of composition. Reynolds regarded 'design' in painting as appealing to the intellect, and painting technique as appealing to the emotions. Reynolds maintained that the emotions of the sublime were best expressed in colour and medium rather than in pictorial structure. In order to attain this access to the emotions, painters began to attempt the effects of natural light and colour *plein air*, so as to capture the

[7] Referring to the attribute 'obscurity', Burke acknowledges the power of oratory, the written word and representation in the visual arts as heightening obscurity, as many things can remain obscured or be revealed in composition. Obscurity was associated with darkness and the feeling of uncertainty and confusion, which he defines as evoking terror.

[8] The poems of Ossian, McPherson claimed, were Gallic originals, but in fact they are said to be largely his own invention. Despite this, they are imaginative theoretical writings on the primitive and the sublime. Ossian is compared favorably to Homer: Ossian is a blind, uneducated poet whose inspiration comes directly from nature. (Thatcher, 103)

immediacy and transience of natural events. This led to a realism in technical mastery that mirrored the rise in popularised scientific observations. Yet, as empirical strategies grew in tandem with the Romantic arts, greater emphasis on the sciences paradoxically pushed the somewhat reactionary Romantic arts towards a mystical relationship with nature.

The strong association of the notion of the sublime by Burke with self-preservation and morality caused Romantic poets and artists to place more emphasis on the emotive effects of terrifying and awe-inspiring natural phenomena and landscapes. Awe and astonishment evoked the 'pathetic' sublime in the popular paintings of the time, a genre which is often referred to as the 'Alpine Sublime'. Crosgrove states that this genre in painting and literature inspired the rising middle classes to venture into nature and find 'sublime' scenes and experiences at first-hand (289). Even more specifically, Nye states that the re-emergence of the sublime in Romanticism was part of a positive re-evaluation of the natural world that, by the end of the eighteenth century, had become a potential source of inspiration and education (4).

Nye suggests that the notion of the sublime effectively played a part in painting, but also that attributes of the notion of the sublime were borrowed to aid in new developments. It is useful to note here that Burke, in his Enquiry, made no distinction between objects of nature and objects that are man made; this is seen as an influence of the study of classical artefacts and architecture, held in high regard by the Neo-Classicists (Jones). The effect however was that, later in Victorian England, new structures of industrialism such as grand public buildings, factories and railroads were built using some of Burkes 'sublime attributes' in an attempt to evoke in the public eye awe at the permanence of a social hierarchy (Nye). Grand and 'sublime'

objects and constructions were thus cleverly created to be associated with pride and a “wondrous recognition of the ‘endless’ possibilities of the industrial order” (Nye).

Romantic art emphasised the idea that the sublime was a ‘truthful’ evocation, a notion that indicated the continuation of a union between man and nature; it was also the result of transpersonal experience rather than of over-extended reason. Cosgrove explains this ‘union’ in representation as “nature capable of containing and expressing the deepest human emotions and the greatest moral force” (238), a force, Cosgrove states, that the Romantics believed to be devalued through industrialisation. Empirical strategies were criticised by the Romantics, and seen as attempting to separate and define individual aspects of a greater whole. In the definitive approach of the empirical sciences, this separation was thought to lead to a dualist understanding of nature and humanity which became more prevalant with Modernity.

In the paintings of Joseph Mallord William Turner, who was working in the early- to mid-1700s, we see pure landscape painting that is very different from the works, for instance, of John Constable or that of the ‘Alpine Sublime’ genre. Turner’s paintings show an attempt to evoke the sublime through the scientific understanding of nature. It is important to note that, by this time, Sir Isaac Newton (1642-1727) had published his theory on the laws of motion and his investigations into the nature and behaviour of light. Chemistry and physical science had long been part of intellectual discourse; the microscope had been in existence since 1600; and certain bacteria had been isolated by this period, too (Janson 634-637).

Turner’s work is an interesting case in the context of the Romantic arts, as his works openly reflect a mutual relationship between empirical influences and Romantic ideals. Andrew Wilton states, in Turner and the Sublime, that Turner’s early

works were closely observed and detailed studies of the natural world. In Turner's mature work, Wilton states, the observed detail grew into what is seen as an attempt to express the "life force of the natural scenes and natural phenomena he observed and depicted". These later works seem almost expressionist in manner, but relied heavily on detailed observation of the behaviour of natural phenomena, such as those of light and water. Wilton claims that Turner attempted to express the 'motion' and 'effervescing' quality of natural phenomena, observing in detail the small variations of colour and texture in nature. He goes on to say that, as Turner's work matured, it attempted to understand and express the experience from within rather than from the viewpoint of a detached observer.

Turner taught architectural drawing at the Royal Academy, and he is noted for having been very precise about detail, perspective and 'proper' representation (Wilson 12). Yet Turner is later hailed for portraying, in his painting, a unity between process and the imagination - between "being and sight" (Wilson 14). This highly Romantic approach would have influenced paintings such as Turner's 1840 painting: *The Slave Ship* (Fig. 3)[9]. Although this painting expresses with intense colour and perspective a quality of feeling rather than of realistic depiction, it is clear that Turner's precise ways and depiction of the phenomenon is influenced by scientific discoveries of the time, such as particle motion and the prismatic behaviour of light. Interestingly, though, Turner's later highly expressive works were regarded at the Academy as representing a fancy rather than realism. In many ways this is justified, as he was not concerned with the agenda of the Romantics, but rather focused on science in observation as part of his artistic process. In my perception, however, the influences of Romantic idealism in his work are more than prevalent. This is clear in

[9] This particular painting is regarded as a Romantic work, in that it shows nature's retribution, in forcing the ship's captain to throw overboard his cargo of slaves. It also acts as a social commentary, as the painting is based on a story in which the captain threw his slaves overboard as they were insured, rather than wreck his ship, which was not. (This was in fact fairly common practice in the slave trade.)

works such as the 1844 painting: *Rain, Steam and Speed – The Great Western Railway* (Fig. 4) in which the elements of the image are hardly recognisable and seem highly abstracted through an attempt to express the force of the phenomena.

English and American painting at the time of Turner are both regarded as being in the genre of the 'Landscape sublime' or 'Alpine sublime'. Depictions in these genres were not at all like those of Turner, and tended to be 'realistic' in representation. These contemporary landscape paintings evoked the sublime through the granduer of nature, highlighting aspects identified by Burke; and took over from what Wilton describes as the "difficulties in expressing the popularised dark spectacle of the sublime in works of formal grandeur". These new sublime landscapes are regarded by Wilton as being, "'uninhabited', 'vast', 'uncultivated', 'huge' and 'savage'", suggesting hostile environments and evoking fear (30). This choice of subject matter was largely influenced by the experiences encountered in the colonising of a New World and the launching of an industrial era.

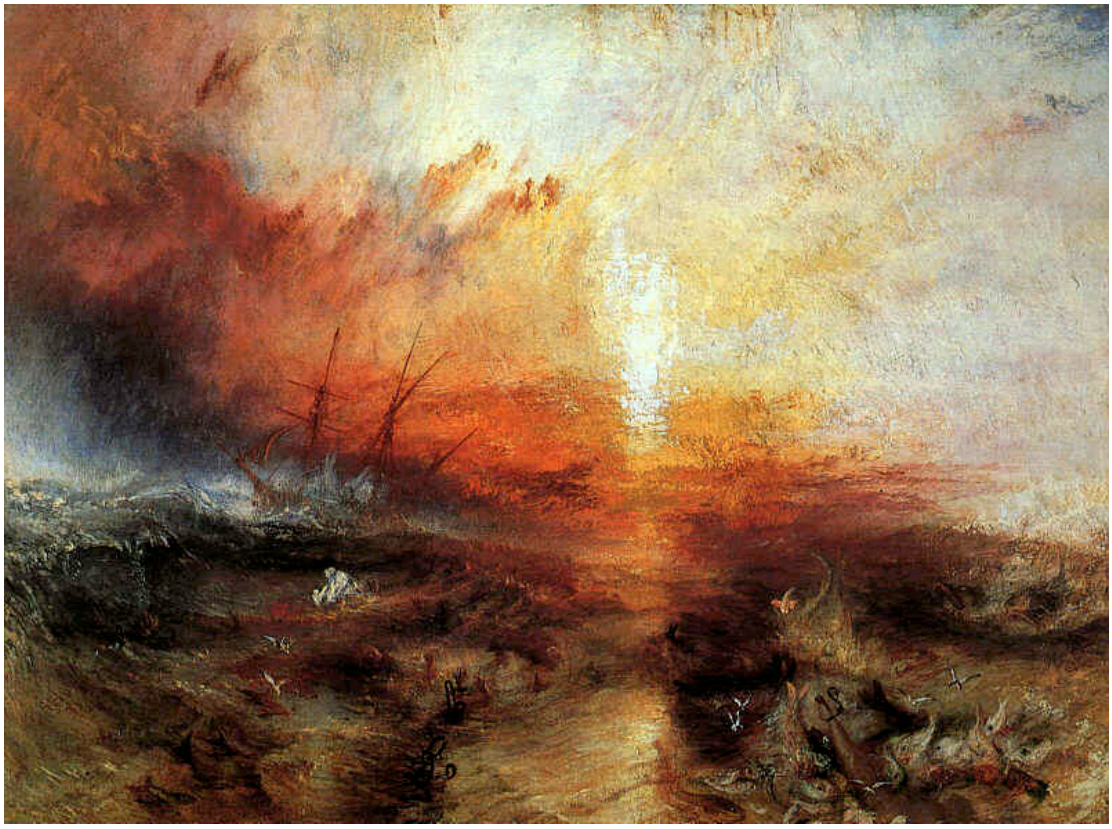


Fig. 3. Joseph Mallord William Turner. *The Slave Ship*. 1840. Oil on canvas, 90.8 by 122.6 cm, Boston Museum of Fine Arts.



Fig. 4. Joseph Mallord William Turner. *Rain, Steam and Speed – The Great Western Railway.* 1844. Oil on canvas, 91 by 122 cm. National Gallery, London.

The Kantian Sublime

Soon after the publication of Burke's Enquiry, Immanuel Kant penned his own philosophical interpretation of the notion of the sublime, namely Observations on the Feeling of the Sublime and the Beautiful (1764), a discussion that he took further in Critique of Judgement (1790). Kant's interpretation took Burke's description of the sublime as an internal experience occurring in the observer as a starting point, but went on to define the notion as it related to reason. Barnes, in An Intellectual and Cultural History of the Western World (vol. 2. 1937) states:

> …Kant agreed that the material content of our knowledge is derived from sensations. But, he said, the forms and patterns through which this knowledge is organized and interpreted in our minds are the product of pure reason. (846)

A similar battle with empirical strategies and Romantic ideals is reflected in Burke's statement:

> The passions which belong to self preservation turn on pain and danger; they are simply painful when their causes immediately affect us; they are delighted when we have an idea of pain and danger, without actuality in such circumstances; this delight I have not called pleasure, because it turns on pain, and because it is different enough from any idea of positive pleasure. Whatever excites this delight, I call sublime.

Here Burke makes an analysis of the emotions associated with the sublime. It is a philosophical approach to explaining experience, which Kant justifies with reason. Barnes states:

> While Kant himself remained agnostic, his philosophical speculations enabled those readers who wished to harmonize faith and reason. They could retain Christianity, as a portrayal of the noumenal world, on faith and yet have full regard for natural science and the rationalistic philosophy. (846)

> If Kant was a philosophical muddler, the state of social science in his age may be blamed. Natural science had made much of progress, but psychology and social science as yet were hardly born. Therefore, a whole realm of human experience, such as apparent and moral freedom, seemed to him unintelligible from the standpoint of science. Kant rationalized this alleged unintelligibility and created out of it a world of unknowable reality. (846)

Boulton calls our attention to the fact that Kant saw Burke's viewpoint only as an inadequate solution to the problem of the sublime (cxxv), and on this matter has the following to say:

> Burke's theory is theory linked with the passions relating to self-preservation; it turns on pain and danger; and it conceives the sublime as provoking astonishment. To Kant astonishment is only the first stage. In his view we feel physically helpless in the face of fearsome natural objects, but because we are independent of nature the mind is conscious of its essential power. Consequently, a feeling of physical inferiority is succeeded by a sense of intellectual or moral superiority. (cxxvi)

Kant's theory establishes the sublime as a dialogue between the individual and the object, a dialogue in which the distinction between the senses and the ego is thought to be forcibly manifested; in which the sublime is an exalted mental or emotional state (Nye 8). Kant also explains the pain or terror attributed to the sublime by Burke by stating that there is a painful discrepancy between the capacity of reason to estimate magnitude of an external phenomenon, and the capacity of the imagination to represent it. Kant states that the sublime attributes of objects and scenes in painting may be an attempt to inspire fear by the use of the imagination, which goes on to represent both a mental state of fear and the reactive and essentially pleasurable capacity to transcend danger on the part of the observer (Wilson 29).

In the Critique of Judgement[10] (1790), Kant separates the sublime into two forms: the dynamic sublime and the mathematical sublime. The dynamic sublime he defines as "the contemplation of scenes that arouse terror, such as volcanic eruption or a tempest at sea, seen by a subject who is safe from immediate danger". And the mathematical as "the encounter with extreme magnitude or vastness, such as the view from a mountain". Kant's theory of the mathematical sublime concerns that which is "absolutely great", and since all phenomena in nature are to some extent measurable, great in relation to other things. Kant interprets the feeling associated with the sublime as an internal process, a dialogue between the individual and the object. This he further describes as the individual experiencing a feeling of weakness, insignificance or pain. The observer then, through recognising the gap between the object and the limitations of the imagination, creates a significant emotion which is regarded as sublime. For Kant, this is a process that reflects a state of attempted reason, forcibly manifested. Of the 'dynamic sublime', Kant argues:

[10] The Critique of Judgement (1790) is the third critique following the Critique of Pure Reason (1781) and the Critique of Practical Reason (1788). The Critique of Judgment looks at aesthetics and their role in regards to knowledge and ethics.

> …we are all the more attracted by [their] aspect the more fearful they are, when we are in a state of security; and we at once pronounce them sublime, because they call unwonted strength of soul and reveal in us a power of resistance of an entirely different kind, which gives us courage to measure ourselves against an apparent omnipotence of nature. (129)

This quote shows that, for Kant, the sublime cannot be experienced when the observer is in a life-threatening situation. On the contrary, the sublime can only be experienced in a removed state that allows for reflection. Therefore, according to Kant, what causes the sublime is the recognition of something beyond the limits of the experience that we can conceive of or know, but which cannot be represented.

Barnes regards Kant as having created a dualism of experience and reality:

> Kant thus held that philosophy can make clear to us the world of experience, the content of which revealed to us by sensations, and the organization and interpretation of which is made possible through the rational powers of the mind. (846)

It is this idea that made the attribution of the sublime to technological phenomena such as the railway a possibility and where Romanticism is left behind by industrial strengths. The notion of the sublime thus came to encompass the whole realm of experience, in which discrepancies could exist between reason and the imagination. This then could attribute the sublime to any experience which could be defined as a transpersonal experience, enriched by nature or not.

We have seen that, through the thinking of philosophers like Burke and Kant, the concept of the sublime, which was understood as an expression of the ‘passions’

by the Romantics, came to be understood as an emotional state caused by the consequence of a situation that challenged both the limitations of reason and the imagination. This was a far cry from the Neo-Classical notion and a good step away from the Romantic sublime.

The American and Technological Sublime

This is a good juncture at which to go on to discuss three notions of the sublime adapted from the European Romantic notion, devised to meet the needs of the New World in North America. These had more of an impact on progress and technologies than in the arts. Nye presents us with these three versions namely the American sublime, the technological sublime and the electrical sublime. Initially, the notion of the sublime was adopted from British Romanticism and in what better place than the New World was a person to experience the greatest and most terrible natural frontiers? By 1820, however, the notion of the sublime had been used in contributing to both the economical and political rise of the United States.

There are two approaches to the notion associated with what Nye refers to as 'the American sublime'.

- The first draws on the sublime sentiments inspired by nature and influenced by the European Alpine sublime. In North America this response was largely Calvinist, associated with the fear and awe depicted and experienced in vast, lonely, dangerous and terrifyingly beautiful landscapes, where the Christian god was the mighty creator and only saviour.
- The second approach uses the notion in an attempt to create a new world on Democratic principles. This shows a strong preference for Neo-

> Classical ideals and was partnered with Greek revival architecture. The growth of new cities in North America looked towards immensity in scale and grandeur thought to reflect the attributes associated by Burke to the evocation of the sublime[11].

According to Nye, the two forms of the American sublime were fused: the acknowledgement of places of natural grandeur (incidentally aiding the establishment of the world's first national parks) was fused with the concept of nation-building, in an attempt to create what Nye describes as an "Imperial form of Nationalism".

In contrast to England, where the aristocracy built grandiose monuments to maintain an idea of social hierarchy, in the United States it was the engineers and artisans who built the first man-made objects and constructions considered to evoke sentiments of the sublime. Public works such as the Erie Canal (1825)[12] became objects of the American sublime, a sublime that was part of a republican program for nationalism. As we can see, once again the definition of the sublime began to shift. Nye states the following in this regard:

> Particular machines and structures were often called sublime during the nineteenth century, but no one linked 'technological' and 'sublime' until after the Second World War. Just as science and the arts were fused in construction, Americans of the Jackson era subsumed new machines within the framework of the natural sublime. They saw the construction of a railroad or a bridge as a triumph of 'art'…. (33)

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[11] Nye notes that in the United Sates, Burke's Enquiry went through at least ten editions before the Civil War in 1861.

[12] The Erie Canal allowed the passage of ships from the Atlantic Ocean to the Great Lakes.

Here we can see the influence of Kant fused with ideas from the Burkian sublime. Great natural phenomena and national parks such as Niagara Falls or the Grand Canyon became amusement parks of the sublime, where their awesome effect did not require the mystical and Romantic notions associated with nature in Britian and Europe for them to be considered sublime. These natural phenomena evoked without question the extremes associated with a Burkian sublime. In the United States the lines blurred between places of great wonder and new inventions for economical and social expansion. Nye makes reference to this version of sublime awe, associated in particular regard to the steam train[13], which was seen by most Americans as a frightening yet wonderful phenomenon. The following quote, a diary excerpt from an anonymous New Yorker, is taken from Nye's American Technological Sublime:

> Just imagine such a concern rushing unexpectedly past a stranger to the invention on a dark night, whizzing and ratterling (sic) and panting, with its fiery furnace gleaming in front, its chimney vomiting fiery smoke above, and its long train of cars rushing along behind like the body and tail of a gigantic dragon –or the d—l himself-and all darting forward at the rate of twenty miles an hour. Whew! (51)

We see here a strong emotional experience associated with technology. When looked at in the light of Kant's arguments, this is a reflection of the "limits of the imagination and a forcible attempt at reason". Nye points out that the attribution of sublime to man-made creations radically modified the philosophical idea of the notion of the sublime. Not only were the precious mysteries of nature being attributed to inventions of science (which could not have occurred within European Romanticism), but in the technological sublime (the second form of the sublime identified by Nye), reason itself had new connotations. The dialogue, to use Kant's term, was now

[13] The steam engine was adapted for railway travel in England in 1814. (Janson 920)

between man and the man-made, where the object itself was a product of reason (Nye). The sense of awe, therefore, was no longer directed towards the mystical, a deity or the unknown, but towards inventors and engineers. It is clear that this change in association was aided by the Kantian approach to the notion, in which a dualism is established between sensory experience and reason. The technological sublime does not therefore endorse human limitations between the individual and the object; rather "it splits those who create and understand the machine, and those who don't." (Nye 197).

The rapid development and spread of technologies across North America was in itself a great phenomenon. The vastness of the railroad or telegraph systems were not designed or created by a single person, and it is possible to understand a further aspect of the technological sublime in this: awe for a systemisation that is attributed to the democratic achievements of the United States. In his last years, the American poet Walt Whitman observed:

> I am not sure but the most typical and representative thing in the United States are what involves in the vast network of Interstate Railroad Lines—our Electric Telegraph—our Mails and the whole of the mighty, ceaseless, complicated (and quite perfect already, tremendous as they are) systems of transportation everywhere of passengers and intelligence. No works, no painting, can too strongly depict the fullness and grandeur of these—the smallest minutiae attended to, and their totality incomparably magnificent. (Nye 108)

Nye is quick to point out that, in the twenty-first century, technologies that inspire awe or terror in one generation soon stop being remarkable for the next, which expects technology to be increasingly more complex and more remarkable.

Nye states that, by implication, the technological sublime “undermines all notions of limitations instead presupposing the ability to innovate continually and transform the world.” (117)

Nye calls what he also refers to as ‘the electrical sublime’ (the third kind of sublime experience), “the double of technology”. Americans viewed the natural sublime and the technological sublime as complementary. Both experiences were a result of an internal experience and were somehow fused with the landscape. In New York in the early 1900s, the White Way was a stretch on which an extensive collection of arc lights and signs were situated, bringing crowds night after night. Nye quotes H.G. Wells on New York’s lighting displays early one evening in 1906 “New York is lavish of light, it is lavish of everything, it is full of the sense of spending from an inexhaustible supply. For a time one is drawn irresistibly into the universal belief in that inexhaustible supply.” (110). Nye describes the electrical sublime as “dissolving the distinction between natural and artificial … creating a synthetic environment infused with mystery.” (110) Initially electricity was used for the lighting of expositions and the exteriors of specific buildings; this eventually led to the lighting of entire streets for commercial purposes. Not only would the lights draw crowds, but advertisements were fully lit to create a spectacle that could be associated with the product. According to Nye what the large lighting systems represented was the American sublime, that which could uplift the lives of American citizens by a manifestation of civic unity through the creation of the myth of ‘inexhaustible supply’.

It is clear that this manifestation of the sublime in the ‘synthetic enviroment’ is just as successful at evoking the notion of the sublime as is the natural enviroment. The technological sublime represented a shift in the object, but the source of the sublime remained within the observer. This observer no longer sought unity with nature in a Romantic sense, but was now looking toward the future rather than the

eternal for transcendence. It becomes apparent, in reading Nye, that between the early- and mid-twentieth century, i.e. after the two World Wars, the notion of the sublime lost its place as an aesthetic concern and became marginally associated with progress. This according to Barnes, was due to the rising tide of scientific discovery that gave way to social optimism.

It is through the two World Wars that technology ceased to be associated with the notion of the sublime. Even though in popular forms of Gothic Romanticism the sublime was associated with an obsession with death, the afterlife and the grotesque, Kant and Burke both suggested that the sublime can only be experienced when the object of the evocation is observed from a safe distance. The aeroplane, rocket bomb and atomic bomb were undeniably three great achievements whose power was associated with the sublime, but they represented a dynamism more imminently harmful than sublimely powerful. According to Nye, the United States attempted to create national hype around the atomic bomb but failed. Rather, the intended enthusiasm was replaced with a great deal of scepticism. The two World Wars are generally regarded as turning points for developments in communication and mechanical technologies. Their catastrophic results awakened briefly an intellectual response which could be associated with sentiments of the sublime in Romanticism. Anti-industrial and anti-war responses are regarded as being associated with the reactions found in Romantisim. These were explored in art movements such as Surrealism and are reflected in late Modern art, such as the work of Barnett Newman which can be seen as an investigation into primitivism. Barnes states that such responses were mostly of a fundamentalist religious nature and actually had little effect on the progress of Modernism.

Nye suggests that the Space Race saw a nostalgic return to the technological sublime after 1945. He states: “The moon landing ... a final avatar of the technological sublime is a literal escape from the threatened life-world”. (120)

In summary of this sub-chapter on the notion of the sublime, the desire to “escape from the threatened life-world” is the consequence of a desired self-preservation in an advanced capitalist society that functions on empirical reasoning. Modern society has left behind the Romantic associations of the notion of the sublime with the natural. We see that the sublime is just as easily shackled to technological development as it was to natural mysticism; both as a way to escape its dominance and to retain a notion of otherness which is based on the idea of transcendence. Despite the changes described here, the notion of the sublime in Modernism is still associated with an internal emotion. This emotion alludes to an overwhelming internal conflict between what is known and what cannot be represented, which includes astonishment at its nature and even terror at its centre.

J.F. Lyotard and the Sublime

We find only with Jean Francois Lyotard in the late twentieth century, in discussions on Postmodernism, there is a re-emergence of the notion of the sublime in a serious philosophical enquiry that regards the notion as an aesthetic category in the arts and science.

What is Postmodernism?: An Answer to the Question is a response to questions arising from The Postmodern Condition: A Report on Knowledge[14]. It is important to note that in What is Postmodernism?, Lyotard regards Modernism and

[14] Commissioned by the state of Quebec, Canada.

Postmodernism as existing at the same time, not the latter existing after the former as the terms suggest. Lyotard states: "… Postmodernism is not modernism at its end, but is a nascent state, and this state is recurrent". What is Postmodernism? predominantly addresses the state of knowledge in the twentith century with special attention given to the sciences and the arts. This work addresses the potential of the arts to challenge normative beliefs originating in politics, science and the technologies. To do this, Lyotard engages the notion of the sublime as an aesthetic category which is seen to challenge established beliefs in the above areas, but most specifically in the sciences. Lyotard uses the notion of the sublime to elucidate the differences between the role of Modernism and Postmodernism not only in the decimation, but also in the creation of these beliefs.

Lyotard's explanation of the state of knowledge[15] in modern society is that knowledge is made up of various discourses each with its own 'language game'. These 'games', he explains, are a way of establishing truths, which form objects of contract between partners and are therefore an apparatus of legitimisation. Lyotard claims that 'language games' "…convey with them rules which support their possibility: the rule that there is no reality unless testified by a census between partners over certain knowledge and certain commitments." (The Postmodern Condition 139). It is the 'language game' that, Lyotard claims, produced Modernism and the emergence of science. But he claims that Modernism left behind the "…metaphysical, religious and political certainties the mind believed it held".

Lyotard regards Modernism as producing what he refers to as 'grand narratives'. These are ideas about life that attempt to define totally the world with regard to its recourse and action, such as capitalism and Marxism. We can clearly see here the link between the empirical thought and these Modernist notions. These

[15] This theory is established in The Postmodern Condition: A Report on Knowledge.

‘grand narratives’ are what he refers to as ‘single world views’. According to Simon Malpas, Lyotard considers the ‘grand narrative’ to be a great danger due to the fact that it has proven to be mostly unsuccessful and too easily marginalises other possibilities in the realm of progress. Lyotard sees Modernism as embodying the formation of the ‘grand narrative’ and understands Postmodernism to be a process of losing the ‘grand narrative’.

In What is Postmodernism? Lyotard states that social justice and the sciences legitimate the power associated with the “single world view” the goal of which, he says, is efficiency. Efficiency, he claims, is the only criterion for techno-science. On this he states:

> In matters of social justice and of scientific truth alike, the legitimation of that power is based on its optimising the systems’ performance – efficiency. The application of this criterion to all of our games necessarily entails a certain level of terror, whether soft or hard: be operational (that is, commensurable) or disappear. (139)

In his justification of the Postmodern process Lyotard claims that Modernism has the capability to shatter certain ideas (like the religious or mystical certainties mentioned above) in order for them to be replaced by ‘realities’ that are based on consensus. Postmodernism, in Lyotard’s theory, shatters these consensual norms. As a case in point in science, Lyotard picks up on what is referred to as ‘paralogy’, which he defines as a model to explain Postmodern science. Paralogy occurs in science when a new discovery changes the rules or ‘language games’ of science. This in turn may change a consensual idea of how the world works. A real-world example of this would be the discovery in quantum physics that the behaviour of

atoms is entirely unpredictable. This of course challenges pre-established ideas on particle motion and the general laws of physics.

Similarly in the arts and culture, Lyotard uses the notion of the sublime as an equivalent Postmodern model for challenging established norms. In the words of Lyotard, the notion of the sublime has "radical potential to break and question established norms". So let us look more closely at Lyotard's understanding of the notion of the sublime. According to Peter Crowther in his essay '*Les Immateriaux* and the Postmodern Sublime', Lyotard's understanding of the notion of the sublime is derived from Kant. Lyotard interprets the Kantian sublime in the tradition of the observer as subject, in which the observer "…develops a conflict between the faculties of the subject, the faculty to conceive something and the faculty to 'present' something." (Lyotard). In defining the notion of the sublime, Lyotard explains by using an example: the fact that we can conceive the infinitely great, but do not have the ability to present an object that will make it visible; this is Lyotard's description of the notion of the sublime in Modernism. In Lyotard's Postmodern notion of the sublime, however, it represents an idea of what cannot be presented (or represented), but is also able to prevent the "formation and presentation of taste" –here "taste" refers to a consensual norm (What is Postmodernism? 146).

Most Modern art Lyotard regards as being art that evokes the sublime (representing the sentiments of the sublime). He states the following:

> 'Modern painters' discovered that they had to represent the existence of that which was not demonstrable if the perspectival laws … were followed. They set about to revolutionise the supposed visual givens in order to reveal that the field of vision simultaneously conceals and needs the invisible, that it

> relates therefore not only to the eye, but to the spirit as well. (Lyotard from Crowther 195)

Lyotard, in What is Postmodernism?, states that, in order to allude to the sublime, the Modern art work must then present something negatively:

> As painting, it will of course 'present' something though negatively; it will therefore avoid figuration or representation. It will be 'white' like one of Malevitch's squares; it will enable us to see only by making it impossible to see; it will please only by causing pain. (147)

Lyotard states the following in The Postmodern Condition: A Report on Knowledge:

> ... modern aesthetics is an aesthetic of the sublime, though a nostalgic one. It allows the unpresentable to be put forward only via the missing contents; but the form, because of its recognisable consistency, continues to offer to the viewer matter for solace or pleasure. Yet these sentiments do not constitute the real sublime sentiment, which is an intrinsic combination of pleasure and pain: the pleasure that reason should exceed all presentation, the pain that imagination or sensibility should not be equal to the concept. (81)

If for Lyotard the sublime in Modernism is associated with negative presentation or nostalgia, in Postmodernism Lyotard believes that the allusion to the notion of the sublime should be "…denied the solace of good forms" (What is Postmodernism? 146). What Lyotard claims is that the Postmodern artist should be "…working without rules in order to formulate the rules of what *will have been done*." (Malpas 48). Therefore Lyotard sees the role of Postmodern art as a means to resist totality and search for new ways.

Lytoard describes the notion of the sublime in Postmodern art in What is Postmodernism? as art that becomes an event that can invent 'allusions' to the conceivable that cannot be presented:

> [Postmodern art]…puts forward the unpresentable in presentation itself; that which denies itself the solace of good forms, the consensus of a taste which would make it possible to share collectively the nostalgia for the unattainable; that which searches for new presentations, not in order to enjoy them but to impart a stronger sense of the unpresentable. (148)

Lyotard uses James Joyce's Ulysses as an example of Postmodern literature that presents the possibility of the "unpresentable in presentation itself" (148). Lyotard believes that the work, in its intertextual manner, is not written within the pre-established rules of literature and narrative, yet it alludes to something without essentially writing it and at the same time invents a new form of literature that stands outside of the normative literature. What Lyotard wishes to show is that in the unpresentable there is capacity to challenge the potentially dangerous aspects of Modernism.

As a conclusion to this discussion on the shifting notion of the sublime, it should be remarked that it is clear that the notion of the sublime before and in its Romantic interpretation played a large role in helping the West (or the global North, depending on your context) define itself and its progress. Let us recapitulate: the 'sublime' before Romanticism was regarded as the reflection of a divine ability to transport the emotions of an audience by the god-given gift of genius. Then, in Neo-Classicism, it represented humanity's ability to find intellectual affinity with the divine and therefore perfect nature in a Neo-Classical adoption of the Renaissance

Humanist program[16]. The Romantic sublime notion, particularly as inspired by Burke, aided the Romantic Movement through the establishment of the evocation of the sublime in a tradition of the observer as subject. The notion of the sublime in the Romantic arts became an aesthetic device to enhance the idea that man finds knowledge and a mystical devine through transpersonal experience enhanced by nature. European Romanticism attempted to retain this concept of a mystical unity formed between man and nature, but the attributes defined by Burke, and also the rational approach of Kant, inadvertently assisted in associating the notion of the sublime with technological progress. It is through the Romantic and the technological sublime, separate but associated concepts, that we see a distinct split in the way the notion is understood. Both are largely associated with the experience of transcendance. One, however, is based on mystical trnasendance enhanced by nature, while the other on a transcendance of the present through a belief in a future enhanced by technology. Lastly, in the late twentieth century, we see Lyotard re-establishing the importance of the notion of the sublime as an aesthetic category that alludes to the unpresentable. With Lyotard it is understood not only as a notion that is evident in Modernist and Postmodernist arts, but is able to challenge social norms and the 'truths' defined by proof and efficiency, which is technology.

[16] We also understand, by this, that much of western development and democracy relied on the idea of an intellectual dominance over nature as a means to define reason and create a consensus on certain ideas.

Chapter 2: The Animate and the Natural

In this chapter I will discuss how natural phenomena have been addressed in certain areas of computing, science and art in the twentieth and early twenty-first century. This discussion will then lead to consideration of the use of data from natural phenomena in interactive digital installation, and how this engages with the notion of the sublime.

Modern and Postmodern art do not require the strict formal parameters found in Neo-Classical and Romantic painting. The notion of the sublime can appear, as Lyotard suggests, in Postmodernism as the creation of allusions to that which cannot be represented in presentation itself. In Modernism, as Lyotard explains, it may be represented by relying on nostalgia and negative represention. To give further insight into the notion of the sublime in modern art where natural phenomenon are concerned, I will begin this chapter by discussing a work of Land Art entitled *Lightning Field* (1977) by Walter De Maria (see Figs. 5 & 7). *Lightning Field* is particularly relevant for this discussion as it is an art work that directly harnesses a natural phenomenon.

As a brief introduction to the movement: Land Art was an art movement that began in the late 1970s and is understood to have re-addressed transcendental attitudes to nature in a late modern and capitalist context (Beardsley). Land Art works are not only regarded as Modern but also as Postmodern. Rosalind Krauss in 'Sculpture in the Expanded Field' (1979) states the following:



Fig. 5. Walter De Maria. *Lightning Field.* 1977. New Mexico. Night. Photo: John Cliett. Copyright: Dia Centre.

> [Land Art]…had entered a situation the logical conditions of which can no longer be described as modernist. In order to name this historical rupture and the structural transformation of the cultural field that characterize it, one must have recourse to another term. The one already in use in other areas of criticism is Postmodernism. (233)

Land Art was based on the exploration of exercises that involved abstract form relative to space, size and natural phenomena. Land Art lay outside the agenda of the advanced capitalist society within which the artists mostly lived and worked. Land Artists found that moving physically outside of cities and galleries allowed them the freedom to deal with larger ideas that concerned the abstract and transpersonal through nature. If the art work was not being made in a natural environment, elements of nature were brought into the gallery to address these same questions.

Despite the clearly Postmodern approach found in Land Art and identified by Krauss, Land Art, in its use of minimalism and abstraction, has its roots in Modern art. Beardsley pronounces in Earthworks and Beyond on the use of abstraction in Modern art:

> The abstract image – whether in primitive or modern art – was felt to present reality as known in the mind rather than merely perceived by the senses. It became a visible icon for the metaphysical. (59)

This reiterates Lyotard's view that the sublime in Modernism may be represented through negative presentaion and nostolgia for what can not bee seen.

The Land Artists' choice of vast and mostly desolate landscapes as a point of departure allowed them to explore their Modernist abstractions in a way that

exceeded mere pictorial representation. It also allowed the viewer to step away from the confines of canvas and sculpture and be confronted with the self in the context of both the environment and the (usually) large-scale art work. Rosalind Krauss in 'Passages in Modern Sculpture' (1977), when referring to Robert Simthson's famous work *Spiral Jetty* (Great Salt Lake Utah, 1970)(Fig. 6), states:

> As a spiral this configuration does have a centre which we as spectators can actually occupy. Yet the experience of the work is one of continually being de-centred within the great expanse of lake and sky. (207)

Robert Smithson says of this work:

> No idea, no concepts, no systems, no structures, no abstractions could hold themselves together in the actuality of that phenomenological evidence. (Krauss 207)

We can see here evidence of Lyotard's Postmodern notion of the sublime, of being able to allude to that which cannot be represented with the solace of forms. Beardsley states in this regard, "(De Maria chief among them)… share in intellectual primitivism. But their work can also be interpreted as a contemporary expression of the sublime."(59). We see in Land Art links to the Romantic sublime in a move away from rationalisation and the effects of industrialisation and an attempted return to a relationship with a mystical natural order.



Fig. 6. Robert Simthson. *Spiral Jetty.* 1970. Great Salt Lake, Utah.

“Spiral Jetty from atop Rozel Point, in mid-April 2005”. Photo: Soren Harward

This very premeditated action of moving away from the socially constricted speaks of a criticism of the Modern that is seen with a number of the Land Artists[17]. Beardsley refers to this as an "intellectual primitivism: engaging in primitive approaches to the metaphysical together with modern intellectualism."(59) This of course is a far cry from the precision found in the emotive landscapes of Romantic painting, yet Beardsely claims, is of the same original substance, "a return to the emotive force of the natural".

The period after the two World Wars up to the present is, as pointed out by Lyotard, a period that is largely dictated by the sciences and technologies. It is also generally considered that, due to techno-science, culture in the twenty and twenty-first centuries has gradually lost a transpersonal association with nature. It is for this reason that after the discussion of *Lightning Field*, which will introduce a new approach to the use of nature in art, I will show how natural phenomena are being represented or used in some areas of computer and technology arts, and how this is infuenced by Modernist approaches to the nature. This field of art often enters into the realm of not only computer science but of biological science. For this reason, in the second part of this chapter I will briefly introduce the concept of 'Biophilia', a term coined by biologist Edward O. Wilson to describe the aesthetic appreciation of the behaviour of animate natural phenomena. Within Biophilia, however, unlike the approach to the Romantic sublime, an aesthetic is derived from seeing unpredictability within known scientific parameters. I have used Wilson's term in this chapter, as it describes how, in a world dictated by science and technology, individuals find aesthetic appreciation in nature through the sciences. After the discussion on Biophilia, I will go on more specifically to address animate robotic and emergent art, as it appears in the relationship between artificial life studies and

[17] Christo, for example, makes large environmental interventions as a way of intermittently engaging different and separate discourses (Lyotard's discordant language games) in the process of creating the interventions.

artistic practice. The importance of detaling this art form is to create a distinction between the evocation of the sublime through interactive art works that use data from natural phenomena (the case studies) and forms of digital and robotic art that rely on the computerised construct of nature.

'Lightning Field'

Walter De Maria, one of the foremost Land Artists, created a number of works in this genre. His most prominent outdoor work is *Lightning Field*. This work does not commit to specific abstraction or mystical forms such as the spiral in Robert Simthsons' *Spiral Jetty*. In *Lightning Field* De Maria creates an artistic relationship between Modernistic formalism and an unpredictable natural phenomenon.

Lightning Field (see Figs 5 and 7) is situated on a flat, semi-arid basin on a high plateau in New Mexico. The site is ringed by mountains in what Beardsley refers to as "…an area of seemingly limitless vistas and a numerically negligible human population"(62). It is a remote location known for its high incidence of lightning during storms. Here De Maria installed "Four hundred custom-made, highly polished poles with solid, pointed tips arranged in a rectangular grid array. They are spaced 67 m apart: there are sixteen poles to the width of 1 km running north-south. Twenty-five poles in length running east-west this runs for 1 mile." (De Maria, Land and Environmental Art 109). The grid is not a scientific formula for attracting lightning, but a means to represent the formal abstractions that are inherent in modern society: the kilometre and the mile. Beardsley states:

…the piece is an experience in the demarcation of space, referring through

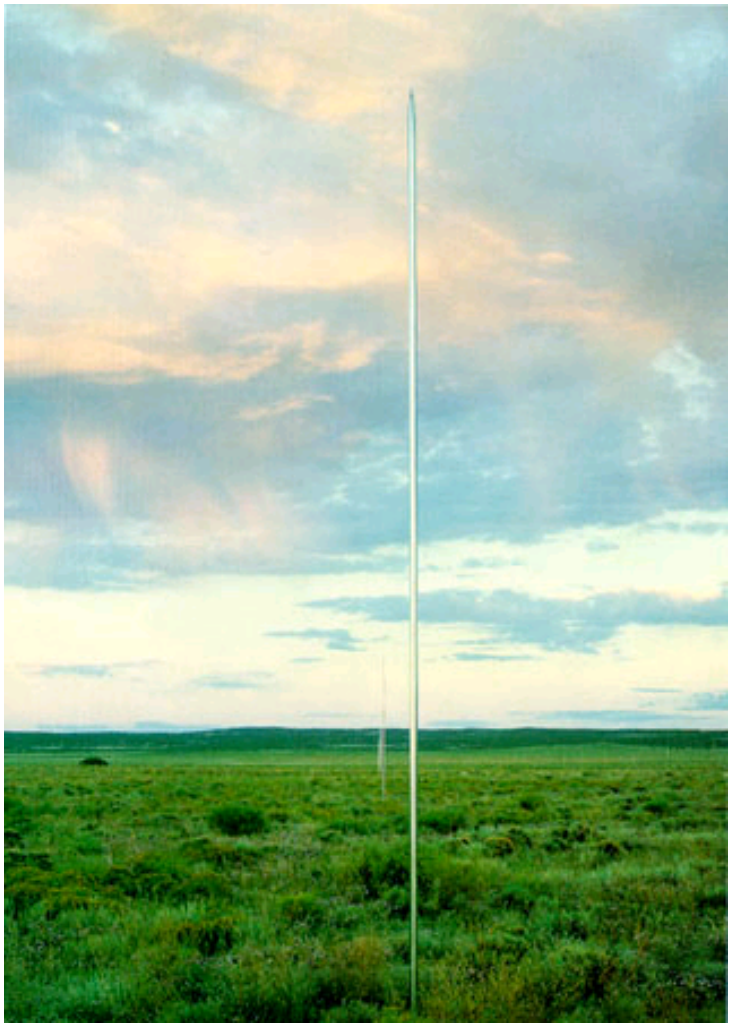


Fig. 7. Walter De Maria. *Lightning Field.*1977. Day. New Mexico.

Copyright: Dia Centre.

> the use of the mile and the kilometre to the manner in which much of the earth has been divided and brought under human sovereignty.(62)

At the site is a wooden cabin, built for spectators to visit and spend the night and, by chance, experience the lightning first-hand. The art work in this remote location is only truly complete when lightning is occurring around it, yet very few visitors see this and the art work is mostly understood through documentation. Despite this, Beardsly believes that the site has its unique characteristics without lightning, “It is a fugitive work, disappearing in the bright midday sun and becoming visible only at dawn and dusk when the entire length of each pole glows with reflected light.” (62). Beardsley also indentifies specific sublime attributes in the work:

> Its central image is *power* – the sometimes lethal power of lightning. The *privations* of solitude and silence are integral to the experience of the work; it is *vast*, both in its own dimension and in the setting it employs. And everywhere is the inference of *infinity*. The poles stand in stately *succession*, *uniform* in height and in the distance between them. As they diminish in the background they create an illusion – like telephone poles or railway tracks – of endless progression. This is reinforced by a tidy and clever mathematical sequence: the number of poles on the kilometre side are four-squared; on the mile side five-squared; the total number of poles is twenty-squared…The *infinite* is also in evidence, if not in the horizontal spread of the earth, then in the extraterrestrial dominions to which it points. (62-63, his italics)

It is evident from this text that Beardesly is refering to Burke’s attributes of the sublime, thereby re-aligning *Lighitning Field* with aspects of the sublime in Romantisim.

I however prefer to address the work further through a Kantian reading of the sublime attributes of the work. De Maria's work alludes to the gap between formal abstraction and a naturally-occurring phenomena. *Lightning Field* allows an unpredictable natural phenomenon to manifest its unpredictable self in the context of the site and, in so doing, alludes to the difference between the limits of formal abstraction and the powerful natural phenomenon, which be mere situation emphasises the power of the natural event which is sublime.

We see in *Lightning Field* the emergence of three associated instance of the notion of the sublime, two have already been identifed: that of Burke through Breadsely and a Kantian reading of the gap between reason and the limits of the imagination. The third and perhaps most relevant is that of the Postmodern sublime as described by Lyotard; where allusions are made to that which cannot be represented. The occurance of lighting is not represented by the artist in context of the artwork site and the use of the grid in *Lightning Field* is not a negative representation; rather it is a counterpoint to a naturally-occurring phenomenon and it is ultimalty and most dominantly through this that sentiments of the sublime are evoked in the viewer.

We see in *Lightning Field* an inherent appreciation of looking at life as complex and unpredictable. The work allows the unpredictable to appear within the known so as to act as a tool to evoke the sublime. As mentioned in chapter one, Lyotard regards the notion of the sublime in the arts as challenging established norms. *Lightning Field* presents a situation that challenges the limits of measure and rule. It's signigficance as a Postmodern work in the eyes of Lyotard would be that it creates a context that only alludes to the notion of the sublime, and does not attempt to represent the notion in a precise Romantic manner and therefore can not be said

to be party to the creation of rules and norms which for Lyotard is regarded as being potentially damaging.

Biophilia

Unpredictability within defined parameters is an evocative tool identified through *Lightning Field.* It also manifests in 'Biophilia' as defined in Wilson's book Biophilia (2002). It is for this reason that I include this section on Biophilia. While showing more clearly the relationship between contemporary aesthetics and science, it gives insight into the degree to which science has become imbedded in our sense of discovery and aesthetics in the twenty-first century. Wilson's point of departure for the term Biophilia lies in the biological sciences, but it describes an aesthetic that identifies humanity's fascination and attraction to nature albeit through scientific exploration. This attraction, Wilson states, lies in nature's endlessly interesting animation and complexity, in how nature is not defined but rather revealed through the sciences. For example, in modern science we can learn the ageless history of an organism by studying its genes, yet we can never recreate or explain the organism completely; therefore it remains interesting. Biophilia would have been unheard-of among the Romantic artists due to their objections to the idea of the empirical sciences contributing to aesthetics. Turner, however, used the knowledge of science as an interpretive tool in achieving emotive representation

Wilson, in discussing Biophilia, points out that, despite the rigidity of scientific exploration, the scientist is always confronted by new problems challenging his knowledge. We see in this a similarity to what Lyotard refers to as 'paralogy'. In The Postmodern Condition Lyotard explains that the need for proof in Modernism (the legitimisation of language games) has become "… increasingly strong as the

pragmatics of scientific knowledge replace traditional knowledge or knowledge based on revelation" (44).

Postmodernism, the sublime and paralogy may, as Lyotard suggests, dispel the totalitarian approach of Modernism. We remember that the Romantics claimed that science would reduce and oversimplify nature, forget the spirit and conquer the mysteries by rule and line. Postmodern science – or what Lyotard refers to as paralogy – and even the notion of the sublime has proven that perhaps this view of science can be dispelled. Lyotard, when refering to paralogy, states that science, in the legitimisation of itself and the need for total control required for proof, has led to the discovery that its method is not always effective. Lyotard regards the total control system – a performance-based ideology of science, technology and the grand narratives – to be a fiction of Modernism. Lyotard writes, "…the relation between the scientist's statements and "what 'nature' says" seems to be organised as a game without perfect information." (Postmodern Condition 57). Wilson suggests that it is these non-distinctions that scientists rely on and that there is an inherent aesthetic attraction in them, particularly with regard to the undefined in nature. What Wilson attempts with the notion of Biophilia is to establish the undefined and unpredictable as an aesthetic, which, like Lyotard's description of paralogy and the notion of the sublime, could only have come under consideration due to Modernist attempts at totally defining natural phenomenon through science.

Biophilia in many ways mirrors the notion of the sublime. Though vastly different, Biophilia is reflected in the Kantian version of the evocation of the sublime in the observer. Kant describes the sublime as an internal dialogue between what is known and the limits of the imagination with regard to what can or can't be represented. In many ways Biophilia is representative of a version of this: where the

aesthetic lies between appreciating nature for its mysteries and seeing the limits of science in explaining or representing these mysteries.

Aspects of science and communication technologies are increasingly becoming a preferred medium for the making of art. The result is a medium that is defined by proof and efficiency, in which it is additionaly necessary to challenge the limits of the medium.

Artificial Life and Emergent Art

Natural science and technology may contribute to an aesthetic such as Biophilia, yet there is somewhat of a disregard in Wilson's Biophilia despite its Postmodern tendencies, towards the agenda of efficiency and power. It is almost inevitable, then, that contemporary digital culture, which uses technology as its medium, looks at nature in dangerously simplistic terms. In this section I will briefly explore the relationship of digital culture to natural phenomena in order to identify what these terms might be. The aspects of digital culture that I will address look at natural phenomena as models for the computerised emulation of nature.

There is a feeling of delight to be derived from watching the unpredictable growth of a plant or the seemingly random direction in the movement of a fish. This may be said to be an aspect of both the Romantic sublime and of Biophilia. It is this fascination with unpredictable reactive change in nature that some digital/electronic artists draw on for interesting digital art works. The computer's ability to process non-graphical information allows artists and scientists alike to create digital emulations of natural processes which, in turn, make for an interesting art works or programmatic and interactive experiences. Unlike video or film, the computer can function outside

of defined time sequences and can be programmed to react immediately to external inputs and virtual environmental changes. This ability in computing has, since the 1980s, allowed biological and computer scientists to use the computer as a way to digitally emulate the behaviour of natural phenomena in an attempt to understand them better.

It is important to note here that digital artists have always looked to developments in science and technology for inspiration and to satisfy technical needs. Developments in the computer and biological sciences often run in conjunction with developments in the digital arts. The computerised emulation of nature is seen predominantly in the field of science known as artificial life, and is referred to as AL or Alife. Chris G. Langton[18] defines AL as:

> …a discipline that studies "natural" life by attempting to recreate biological phenomena from scratch from within computers and other "artificial" media. AL complements the traditional analytic approach of traditional biology with a synthetic approach in which, rather than studying biological phenomena by taking apart living organisms to see how they work, one attempts to put together systems that behave like living organisms.

AL is an arm of artificial intelligence, also referred to as AI, which is defined as a "scientific understanding of the mechanisms underlying thought and intelligent behaviour and their embodiment in machines."[19]

Ursula Huws, in her article 'Nature, Technology and Art: The Emergence of a New Relationship?' writes about the impelling crossover between digital/electronic art

[18] http://www.aaai.org/aitopics/html/alife/html. 16 Nov. 2006.
[19] http://www.aaai.org/home.html. 16 Nov. 2006.

and artificial life sciences. She quotes Lars Risan, an AL scientist, who states that AL is "…essentially a branch of engineering which involves a much greater degree of intimacy with the subject (unlike pure science), and therefore as artistic expressions AL simulations have aesthetic value." (37). It is for this reason that collaborations between AL scientists and artists take place, and why artists find AI and AL computing an interesting medium for creation and expression. AL scientists, for their part, are interested in working with artists not only because certain processes and concepts are more easily understood through visual or sonic interpretations, but because artists' interests do not essentially lie in the developmental needs of technologies. These intereactions between artists and scientists bring about different 'relationships' with technology. In the late 1980s artist Norman White created *Helpless Robot* (1987), a cumbersome-looking heavy object (a robot) that cannot move by itself, but can sense movement and will prompt a passer-by to help it, or not to touch it if it senses that it is being moved (Huws 38). This helpless aggressiveness creates and explores interesting and reactive relationships between the object and the participant (passer-by), designed and based on the emulation of human or animal behaviour. This study / art work of object to participant behaviour is both intresting and relevant in an age given to 'personal technologies'.

Another type of computerised emulation that AL researchers share with artists is what is termed 'Emergent Art'. 'Emergence' is a scientific theory that attempts to understand as a model the creation of a single complex system (like an ants' nest) from a number of simple, separate and self-interested organisms (like ants). Emergent Art usually exists as a graphical display (often referred to as a 'virtual environment') of graphical objects (also referred to as 'avatars'). These objects literally evolve or develop in accordance with programmed reactions to pre-determined conditions that appear in, or are entered into, the virtual environment.

An example of an Emergent art work is the 1997 work: *Life Spacies II* (Fig.8)[20] created by Christa Sommerer and Laurent Mignonneau. *Life Spacies II* is a web-based interaction model that transcodes text to form. Visitors to the Life Spacies website can create their own artificial creatures by sending text, which is then translated into a 'genetic code', to the project server. This 'genetic code' creates parameters for the design of a unique creature and includes form, colour, texture and number of bodies or limbs. The artists state on their project web page that most creatures vary greatly due to the variations in text. These creatures, once made, live in the *Life Spacies II* environment and look for food, moving at various speeds determined by their design. Their food is the text of the same genetic code that can be interactively released by visitors. Some may starve and die, while others find partners and breed, creating offspring that have a shared genetic code.

As one can imagine the outcome of the emergence is unpredictable for the person interacting with the environment. The impression of a self-evolving outcome alludes to natural processes and can regarded as having an aesthetic attraction, similar to what is experienced in the attraction to animate and procreative natural phenomena identified through Biophilia. There are inherent emotions in this attraction that are associated with the notion of the sublime, such as both fascination and awe. *Life Spacies II* makes visible technology functioning of its own accord as a digital emulation of life forms that can be remotely responsive. Reactions, however, are only surface-deep (i.e. at the interaction level), but still the relationship created in the interaction is one of reverence.

As we have seen, artists use the interactive relationship with animate technologies to allude to metaphorical relationships or the experience through an unpredictable environment of 'life' forms. In the response evoked, this computerised

[20] All information about this artwork was found on the artists' website, in which each project is fully documented.



Fig. 8. Christa Sommerer and Laurent Mignonneau. *Life Spacies*. 1997. ICC InterCommunication Museum permanent collection. Tokyo, Japan. Copyright: Sommerer & Mignonneau.

emulation is very similar to objects of the technological sublime referred to in chapter one. Like most technologies, these art works are only remarkable with regard to the technological achievements of the time and do not, as we have seen, achieve the evocation of the true sentiments of the sublime in the Romantic sense. The interest for the participant is temporary and predefined. For this reason, works that use computerised emulation tend to lack a certain quality of the vitality which would be inherent in the biological life and lack the true potential of the un-presentable or the undefinable. This is a pitfall in attempting to emulate nature with technologies, whose end is efficiency and which require precise control. These systematised creations soon expose their processes and stop being awesome. As stated before in discussing Kant and Lyotard; it is the known that cannot be presented that makes the sentiment truly sublime. This is because the sentiment includes both pleasure and pain: pleasure in knowing and pain in acknowledging the limits of the imagination (and science) to present what is known.

As emerges from the discussion in the three parts of this chapter, allowing the unpredictable and the un-presentable to appear within defined parameters is strongly linked to our experience of natural phenomena in Modernism. The Modernist context is one that is reliant on sciences and technologies for the definition of knowledge and the acquisition of progress. This has influenced the notion of the sublime in Modernism so that it has become an aesthetic category that can be negated by science and technologies. Yet, with this and through Nye's definition of the 'technological sublime' we have also seen that it is important to take note of the pitfalls in attempting to emulate the experience of nature with technologies. Technology is too quickly redundant and it sorely does not encompass the metaphysical aspects of the natural sublime.

Chapter 3: Data Visualisation Art and the Sublime

In chapter two I presented the dilemma of making art which evokes the sublime where technology is the medium. How, then, is it possible to allude to or evoke the sublime through works that use digital technology as a medium? This question arises particularly where self-critical and meta-narrative forms are not efficient in evoking the sublime, only in revealing the context. In this chapter, I will address the use of digital data as a phenomenon in its own right, and its use in digital interactive art as a move towards a resolution of this dilemma.

'Data' is a proposition that reflects reality; a plural noun, it suggests an observation of a variable in a social or environmental study. Most significant in this context, however, is that data is collected and organised to be used by digital technologies, but is not itself a technology. Rather, data is the start of reflection: it is not sought to be predictable, but is used as proof and comparison. In addition, for a mass of data to be understood by the human observer, it must be processed and appropriately presented through digital technologies.

In this chapter I will discuss the use of data in art in a form of art termed 'Data Visualisation Art', which I will refer to more simply from here on as 'data art'. In data art, data is generally used as a compositional tool where data, as sets of numbers and measures, is used as a variable in software programs to create both musical and graphical representations. To do this, parameters in computer software must be created to re-interpret the data so that it takes on an intelligible form. Packaged software can be used, or unique software can be created for artistic outcomes of this nature. Creating criteria through software is a way of transforming events, phenomena or statistics existing as data into dynamic or static art works that can be

understood by the human observer. Most crucial, however, is the fact that if this data is not used carefully, the data's subject is simply rendered irrelevant. Consider an example: a storm can be analysed through environmental sensors yielding data that include its wind speed, cloud density and atmospheric height over a period of time. This data can then be plotted on a digital music software program, where each of the data sets is respectively translated into frequency, tone and amplitude. The outcome will effectively be a true interpretation of the data in musical form, but may not necessarily present any comprehensible understanding of the storm. This use of the storm's data will also be vastly dissimilar to a first-hand or mimetic interpretation of the storm, perhaps played on a piano (Ostrowski). Listening to the digital sound will most likely be noisy and incomprehensible and the data's subject will have become irrelevant. Therefore, using such data simply as a compositional tool only creates a reflection of the data as an instrumentalised variable sequence and does not result in a comprehensible piece of music that is derived from this natural phenomenon (Ostrowski). This is why, when using data as a compositional tool, it is difficult to design comprehensible and clear outcomes without compromising the subject of the data. In this chapter I will discuss why, in particular regard to the evocation of the sublime, an art work that uses data should represent the essence of the data's subject without losing comprehension due to compositional constraints.

New Media Art theorist Lev Manovich largely contests the use of data as a compositional tool in artistic representations. This is mostly for the reasons described above, because it is easy to select – for the sake of clarity and comprehension – data to be used purely as a source for programmatic change, ignoring the retention of meaning in the data's subject. To explore this further, I will address Manovich's notion of the 'anti-sublime' with regard to data art, which is presented in his paper ,'The Anti-Sublime Ideal in Data Art'. I will then go on to show how Manovich's notion may be misfounded by considering a paper by Mathew Ostrowski entitled 'Anxiety of

the Client: The Database as Compositional Tool' [21]. Ostrowski discusses in more detail these issues in data art. He shows that the technical versus artistic practices inherent in data art can reveal methods of art-making with data that bypass the issues that Manovich raises. This form of art-making can avoid the pitfalls of arbitrary choices made for the sake of compositional clarity, through what Ostrowski calls the "cognitive conflict of the romantic subject and the creative response that recapitulates it by means of the imagination." (7).

The Anti-Sublime Ideal

Data art works use either live or pre-captured data. A mass of data is generally difficult for the individual human mind to comprehend unless it is processed in some way and representation is created through certain restricting criteria. Data can therefore be said to be made 'readable' on computer software and hardware. Data art captures information as data from the concrete, and then re-interprets or represents it in virtual forms that exist either on visual planes (X, Y, Z), as sound, text or as electronic pulse.

Lev Manovich speaks of 'dynamic data visualisations' and identifies data art or dynamic visualisations as representing what he terms the 'anti-sublime'. Manovich refers to the sheer extent of the data in many of these visualisations as being popularly regarded as 'sublime' for two reasons. Firstly, because data may not initially be captured for human consumption, and in its raw form it cannot be known without digital processing. Secondly, because data (being generally expressed as numerical variables) may on any given subject be an excessively vast collection of

[21] Presented in 2005 at the Unyazi Electronic Music Festival Symposium, held at The University of the Witwatersrand.

parts, and therefore has sublime attributes (8). Manovich argues that data visulisation or art therefore represent the 'anti-sublime'. The premise for Manovich's argument is centred on the idea that what is sublime cannot be represented (8-10). By stating that data art is the 'anti-sublime', Manovich is attempting to express the capacity of data art to simplify the data completely and not in any way to allude to the data's sublime qualities.

Although we know that the the 'anti-sublime' is a distinct possibility for data art, it is vital to point out that the arts - visual, sonic or literary - do not attempt actually to be the sublime, but only to evoke or allude to the notion of the sublime as a cognitive or emotional state. Therefore, where some instances of data art may indeed reflect Manovich's idea of the 'anti-sublime', an appropriate presentation of things which have attributes of the sublime (as seen in *Lightining Field*) cannot be regarded as purely 'anti-sublime'.

Contrary to Manovich's theory, it is possible, through appropriate representation, to allude to the sublime qualities of data and to evoke in the observer the sublime. Matthew Ostrowski indicates that it is the role of the artists concerned to represent adequately the subject of the data without denying the data its sublime attributes. This, we understand through Ostrowski, can be achieved by the careful assessment of the technical requirements of the visualisation as opposed to the intentions of the artist to avoid what Ostrowski refers to as 'rational instrumentalism'. I will try to show how this may be done by looking at an example of an art work presented by Ostrowski. This work is called *Listening Post* (2001-2003) (Fig. 9 & 10), created by artists Mark Hansen and Ben Rubin.



Fig. 9. Mark Hansen & Ben Rubin. *Listening Post.* 2001-2003. At Whitney Museum of American Art. December 2002. By David Allison.



Fig. 10. Mark Hansen & Ben Rubin. Listening Post. 2001-2003. At Brooklyn Academy of Music, Next Wave Festival. December 2001.

'Listening Post'

As already seen in *Lightning Field*, the successful evocation of the sublime in data art may require a certain amount of freedom for the sublime attributes of the data or natural phenomenon to come to the fore. Ostrowski holds that the pitfalls of rational instrumentalism (by which most data art is made) lie in the compositional choices that need to be made for clarity when limiting the scheme for representation (3). These choices are generally made according to the rules of good design, as, due to the requirements of comprehensible interface, artistic outcomes cannot always take into account the data's subject or the special attributes of the data.

Ostrowski looks carefully at the technical aspects of data art. The title of his paper 'The Anxiety of the Client: The Data Base as Compositional Tool' alludes to the importance of the tools with which the data artist works. Ostrowski focuses our attention on what he refers to as the 'client': the component of hardware and software that both translates data and presents the art work. For Ostrowski, the client can become the art object, unlike the object of the traditional arts that Ostrowski describes as mimetic or sympathetic, The artist is in charge now of the instrumental, logical and analytical (2). For Ostrowski the 'anxiety of the client' is in the lack of awareness of the dialectic between the mimetic and the analytical with regard to the client as art object. Through *Listening Post*, Ostrowski explores a successful interrogation of this dialectic.

Mark Hansen and Ben Rubin's *Listening Post* is a data art installation. It takes fragments of text in real time from thousands of unrestricted Internet chat rooms and other public fora. In an installation situated in a darkened room, these bits of text are read (or sung) by a voice synthesizer and are also displayed across a

suspended grid of more that two hundred small electronic screens (Ostrowski 8). The immediate effect of this work is intensely beautiful. The flickering of hundreds of electronic screens in the dark is described by Ostrowski as ”eerily echoing the sound of thousands of voices seeking contact across the electronic void” (9). What makes this work even more interesting is the irony of the fact that the work uses advanced techniques of surveillance to monitor the thousands of internet contacts, which Ostrowski describes as, “the ultimate extension of digitising rationalism as presented for aesthetic consumption.” (7).

In *Listening Post* artistic choices were made that show evidence of a sympathetic creator and an artistic negotiation of the content which cleverly integrates the work’s functional instrumental needs. The data is not denied its complexity and enormity in presentation. The interpretation of the data through the client system discourages the viewer from trying to grasp the exact details of the data. The viewer is not expected to, nor could he or she possibly process all the messages to make a cognitive whole of the parts. However, it is clear through the work that the messages represent a collection of millions of live conversations. The art work is not an analysis or archive of messages, and is not intended to act as one. Rather, *Listening Post* is designed to make the viewer aware, through the client (the installations and interpretative device), of the enormity and seemingly unending quality of the source. Because the data being shown through the client comes as text and synthetic voice, the viewer ‘understands’ the subject of the data without necessarily grasping all the minute details. The overarching understanding of the data is that it is a real-time ‘song’ that is continually occurring, and because of this the observer is struck by a feeling of transcendence in the gulf between scale and presentation. This can be described as a conscious decision made by the artist not to define the data’s parameters.

Ostrowski adds to an understanding of the work's aesthetic appeal:

> Once inside [experiencing the work], we are at the mercy of a self generating system, a research project into our very minds that is only justified by the demands of the client that collects, abstracts and re-presents. The paradox of the client as subject becomes our own as we participate and co-conspire in the art work. Data lurks behind not only the physical phenomena of the world, but behind our interiority, as the very possibility of the subject dissolves into the inaccessible world of data. (10)

As is re-affirmed in this quote, the viewer becomes aware of the inaccessible data as a phenomenon in its own right which is somehow inexplicably linked to himself.

What has been identified through this example is the need of the artist to be aware of the possible pitfalls of the rational instrumentalism inherent in the client. The artist, while working with a tool not designed for art making, must acknowledge that simply using data as a compositional tool does not necessarily maintain a successful aesthetic representation of the subject. Data in its raw form is not necessarily intended to be comprehended by a human observer, but may be assimilated by a client for the observer. In the aesthetic use of data, the artist must acknowledge its distance from human sensibility and the difficulties inherent in its interpretation through a client.

Lyotard writes of the sublime in connection with the Kantian version of the notion as follows:

> It carries with it both pleasure and pain. Better still, in it pleasure derives from pain... this contradiction, which some would call neurosis or masochism,

> develops as a conflict between the faculties of the subject, the faculty to conceive of something and the faculty to 'present' something. The sublime takes place when the imagination fails to present an object which might, if only in principle, come to match a concept.

The *Listening Post* installation is a good example of this, by giving pleasure in what Lyotard would refer to as "solace or pleasure of form" through the visual and aural attraction in the installation. There is an additional pleasure in the installation, which is the knowledge that the data that runs the art work is a social phenomenon in which the viewer may play a part. The pain when observing *Listening Post* lies in the un-whole and fleeting representation of the subject of the data and the data as subject. We have seen that, for the makers of *Listening Post,* a deliberate exclusion of the task of surveillance is what Ostrowski calls the "anxiety of the client", but can also be understood in the context of this thesis as the anxiety of technology.

Lyotard's definition of Postmodernism relies heavily on the presence of instabilities. We saw earlier that, for Lyotard, the sublime and paralogy show evidence of instabilities that question Modernist ideals and are therefore Postmodern. Similarly, I regard Ostrowski's 'anxiety of the client' to be a Postmodern model of a similar kind, as it shows technology as destabilised.

In interaction design it is possible for an interaction to be designed to evoke sentiments of the sublime. *Listening Post* not only shows an astounding artistic view of a vast social phenomenon, but also reveals the limitations of technology when attempting to create an evocative experience in the viewer. The Postmodern relevance of the sublime (as defined by Lyotard) in *Listening Post* is visible through this revelation of the limitations in technology. As we see above, an emotive response is evoked by the missing contents – or negative presentation – which

Lyotard would regard as modern, but *Listening Post* also evokes the sublime by "alluding to the un-presentable" which Lyotard regards as truly Postmodern. The surveillance system that runs this art work cannot function efficiently as a surveillance system, but in it's 'broken state' reveals the data's phenomenological nature.

Chapter 4: Data From Natural Phenomena

In this chapter I present the next two case studies after *Listening Post*: *Grower* and *The Cloud Harp.* I will first present the technical and functional particulars of these two. The particulars are introduced before arguing for the relationship between the works and the notion of the sublime. These two case studies are specifically different from *Listening Post* in that they do not use data from a social phenomenon, only from naturally-occurring phenomena. The consequence of this difference is that the sentiments of the sublime in these works have a twofold origin. Firstly, the data is regarded as having sublime attributes. Secondly, the phenomena from which the data is captured, due to associations with Romanticism, are themselves regarded as having sublime attributes.

The two case studies additionaly engage a participant who here becomes a participant by engaging in both observation and physical activity. Therefore, just as with *Listening Post*, the participant becomes the primary subject of the art work, and the sublime is then evoked as an experience through the installation. In these two works it can be found that there are similarities in the methods used for the evocation. These relate not only to Lyotard's modern and Postmodern theories of the sublime in art (as found in *Listening Post*), but much earlier associations to Romantic and pre-Romantic notions are also engaged through associations made with the natural phenomena used.

'Translator II: Grower' (Version 1.0)

Translator II: Grower (version 1.0) was created by American New Media artist Sabrina Raaf. The work is otherwise referred to more simply as *Grower* (Fig.11). This

first version[22], which I will use as my case study, was completed and exhibited in 2004 (Raaf). To put it in simple terms, *Grower* consists of a robotic arm that draws vertical green lines (representing grass) on the perimeter walls of the exhibition space. The length of these lines is determined by the amount of carbon dioxide (CO_2) present in the installation space.

Grower uses amounts of CO_2 in the air in the surroundings of the installation space. Raaf describes the technical functioning of the art work as follows:

> This sensor is mounted high on a wall of the exhibition space and sends data wirelessly to the robot. The number of people in an exhibit space breathing in oxygen and exhaling CO_2 has an immediate effect on the sensor. My robot takes a reading of the CO_2 level every few seconds and in response it draws a vertical line in green ink on the wall. The line height pertains directly to the level of CO_2 (and therefore also the people traffic) in the space. The more CO_2, the higher the line is drawn - the maximum height being 1 ft. Once Grower completes a line, it moves forward several millimeters and repeats the process. By the end of an exhibition, the bases of all the walls in the space are covered with fine green lines which together resemble a cross-section of a field of grass. (Raaf 'Grower')

The drawing resembles the representation of grass, therefore the installation artificially copies a natural occurrence, i.e. the growth of grass, which is naturally partly reliant on CO_2. This happens in real-time and a progressive 'growth' is made visible to the viewer.

[22] Version 1.0 varies very little from the other versions; only the robotic component is different. Version 1.0 is discussed on Raaf's website: http://www.raaf.org. The naming of the artwork with a version number is borrowed from software programming and technology development practice, where the development process goes through test periods and is always being improved on.

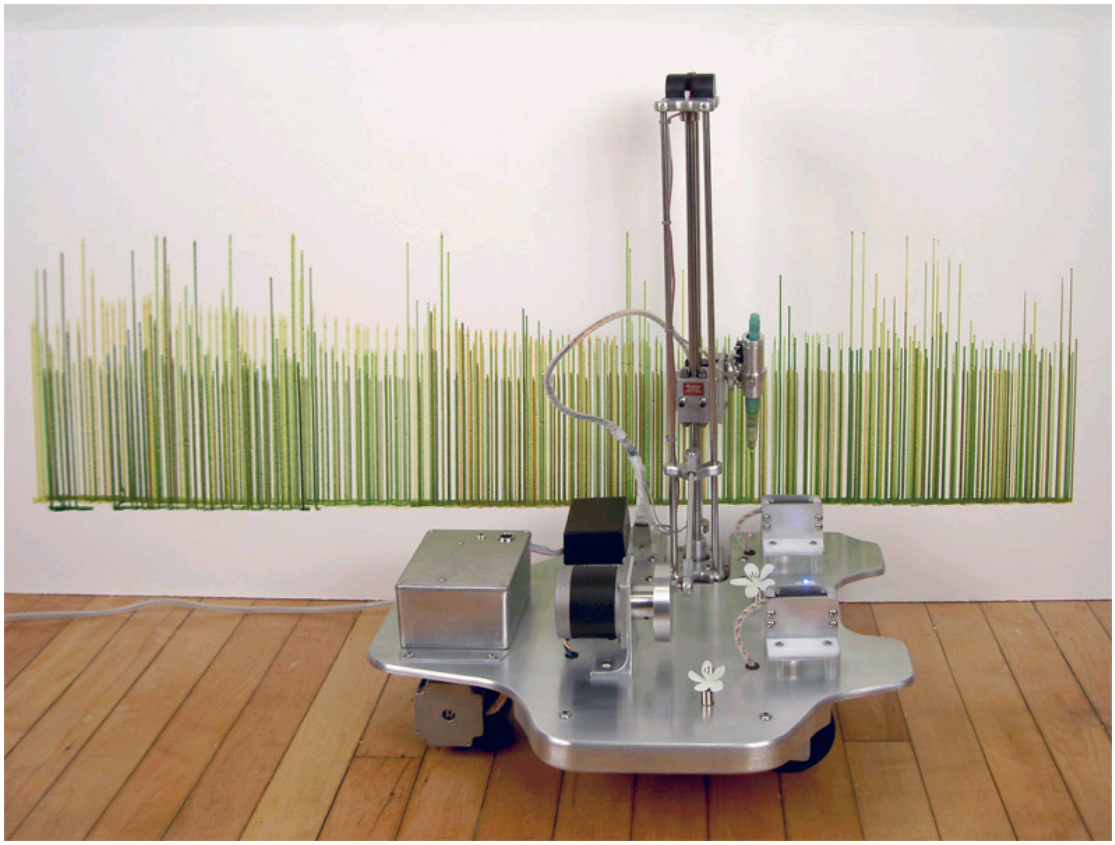


Fig. 11. Sabrina Raaf. *Translator II: Grower (version 1.0).* 2004. “Grower”. Photo: Sabrina Raaf.

Raaf states on her website that her interests in the making of art lie in the co-dependant relationship between human and machine. Concerning *Grower* in particular, Raaf writes the following:

> My machine's grass growing is a dynamic, emergent behavior in which humans participate involuntarily. This behavior allows the Grower to 'nest' the space – meaning, make the space into one where you find evidence of natural, organic change. The drawings of grass may not be organic in a strict sense, but they may be read cognitively the way we read plants or gardens outside. Is the grass thriving? Has there been much activity? Watching the artistic output of a machine that is so sensitive to its environment makes the people in the space more sensitive to their environment and its conditions. The grower also provides a memory, through its drawings, of those conditions.

Grower's artistic outcome is the marked green lines representing grass. In the contemporary western culture in which the art work was presented, most people know that the growth of grass relies on CO2, which adds an element of reality to the art work. Even though the art work is a simplified version of a natural process, participants become "more sensitive to their environment and its conditions" and the work creates a "memory" of the occurrences in the space, as Raaf states. In addition to this, the participant is involuntarily involved in a synthetic emergent process.

This involuntary participation creates an internal awareness in the participant, even more so because the phenomenon of breathing is one that is so unconcious and powerfully linked to life. This involuntary participation is the inclusion of the viewer in the creation of the art work and the experience thereof. As I will show later,

this experiential inclusion is the key to the evocation of sentiments of the sublime through this work.

'The Cloud Harp'

The Cloud Harp Project, a more complex and integrated project compared to *Grower*, has resulted in a number of repeat public installations all named *The Cloud Harp*. The project was completed in 1997 by the NXIO GESTATIO Design Lab, which is headed by Nicolas Reeves. The Design Lab explains that The Cloud Harp Project was derived from a concept of the seventeenth-century astronomer Johannes Kepler, known as 'Music of the Spheres'[23]. This concept, according to the project website, is regarded as the first attempt at the transposition of music from natural phenomena. *The Cloud Harp* is therefore also known as *Keplerian Harp*.

According to the description by its author, Nicolas Reeves, *The Cloud Harp* acts very much like a giant inverted CD player. By this he means that *The Cloud Harp* tracks the movement of clouds directly above it via an infrared beam and a telescope. He explains that the infrared ray and telescope read the height, density and structure of the clouds and transpose these readings into real-time live musical compositions ('The Cloud Harp'). The detailed description of the functioning of *The Cloud Harp* from the project web site is given below:

[23] 'The Music of the Spheres' was conceived by Johannes Kepler around 1595 (Plant), at a time when science, religion and mathematics were seen as a 'luminous unity' in the Pythagorean tradition. Briely described, 'The Music of the Spheres' is based on an earlier discovery by Pythagoras, that the relation of the pitch of a musical note is dependent on the length of the string on which it is produced. This brought about the mathematical ratios of Western music. Kepler, an astronomer and astrologer (at the time the two fields were regarded as synonymous), found that the angular velocities of the movement of all the planets closely corresponded to musical intervals. When the intervals between all the (then) visible planets where compared, the results showed the intervals of a complete scale. Kepler is quoted as describing the phenomenon as: "The heavenly motions... are nothing but a continuous song for several voices, perceived not by the ear but by the intellect, a figured music which sets landmarks in the immeasurable flow of time."(Plant). To this day, the equation for 'simple harmonic motion' is central to many of the laws of physics.

> The melodies and sounds are determined by factors such as cloud height, density, structure, luminosity, and meteorological conditions. Each cloudscape produces a particular kind of sequence. The Harp is polyphonic: it can sing on many different voices simultaneously, each one being mapped to a specific altitude range. It sings 24 hours a day, 365 days a year, by any weather. When the sky is blue, it remains silent. The range of the instrument is 25 000 feet or 8 kilometres, which means that some high stratospheric clouds, such as cirruses, are not detected. (Reeves 'Home')

The sounds emitted by *The Cloud Harp* are made from data stored and manipulated in a software program designed for *The Cloud Harp* that reacts to the 'cloud' variables specified. There are two versions of this software: the following is again a direct quote from the website describing the two software versions (see Fig.12):

> The first one, called MIDI-LIDAR, based on the MIDI protocol, uses cloud data to modulate synthesized and sampled sounds; when it runs, the sounds of familiar instruments, such as piano or strings, can be heard.
>
> The second one, MINUIT-LIDAR, creates its own timbres and tones real-time, by using cloud data to shape the audio waves or to determine the harmonic structure of the sounds that are emitted. Over these sounds, samples of Quebec soundscapes are played. They include people telling tales, fiddlers, animal noises (whales, wolves, birds, insects...), sounds of wind and water streams... (Reeves 'The Sounds')

The more specific details of the transposition of the cloud data to music are given as follows:

> When clouds are detected, their height defines the frequency of the notes, and their density determines the amplitude of the sounds. Different instruments are associated with different altitude ranges. For instance, if you hear only short, grave sounds, slightly distorted, somewhat between a piano note and a bell, this means that low clouds (under 1100 m, or 3600 ft) are detected. Very short percussive sounds heard along with high-pitch sine waves correspond to clouds over 4800m, or 16000 ft.
>
> Though this is not very frequent, you may hear sequences that seem to loop for many minutes: some cloudscapes have a strong regularity, which in some cases can be seen also by the eyes. (Reeves ' Home')

As a sound work *The Cloud Harp* exists as an audible streamed recording available on the Internet. This 'music' can also be heard in real-time in a public installation. In this case which is what I will be addressing as my case study, *The Cloud Harp* is installed in an architectural housing (see Fig.13), the structure of which is based on data derived from cloud structure:

> Just like the music is created from the cloudscape, the architectonic structure (the "buffet") is derived from cloud geometry: the different modules are arranged according to algorithms similar to the one that are used for cloud simulation, and to produce the music. The laser and the telescope are housed in the highest tower: it is from there that the laser beam scans the sky. (Reeves 'The Architecture')

In the same structure are housed speakers so that the observer can hear the sound, and an up tilted mirror so that the same person can see the clouds in question. Most importantly, the software and hardware that allow the sounds to be 'created' in real-

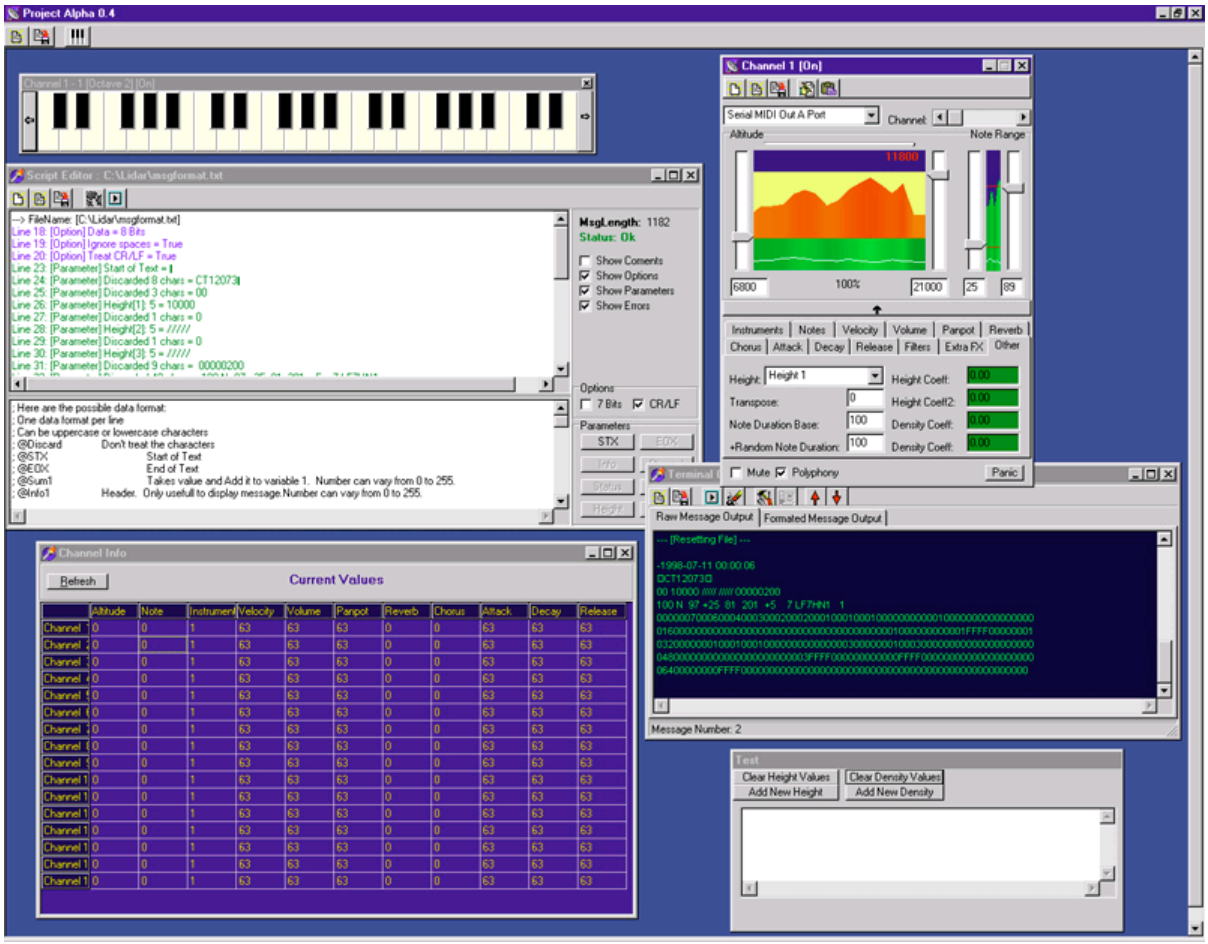


Fig. 12. NXIO GESTATIO Design Lab. *The Cloud Harp.* 1997. "Image of MidiLidar Interface".

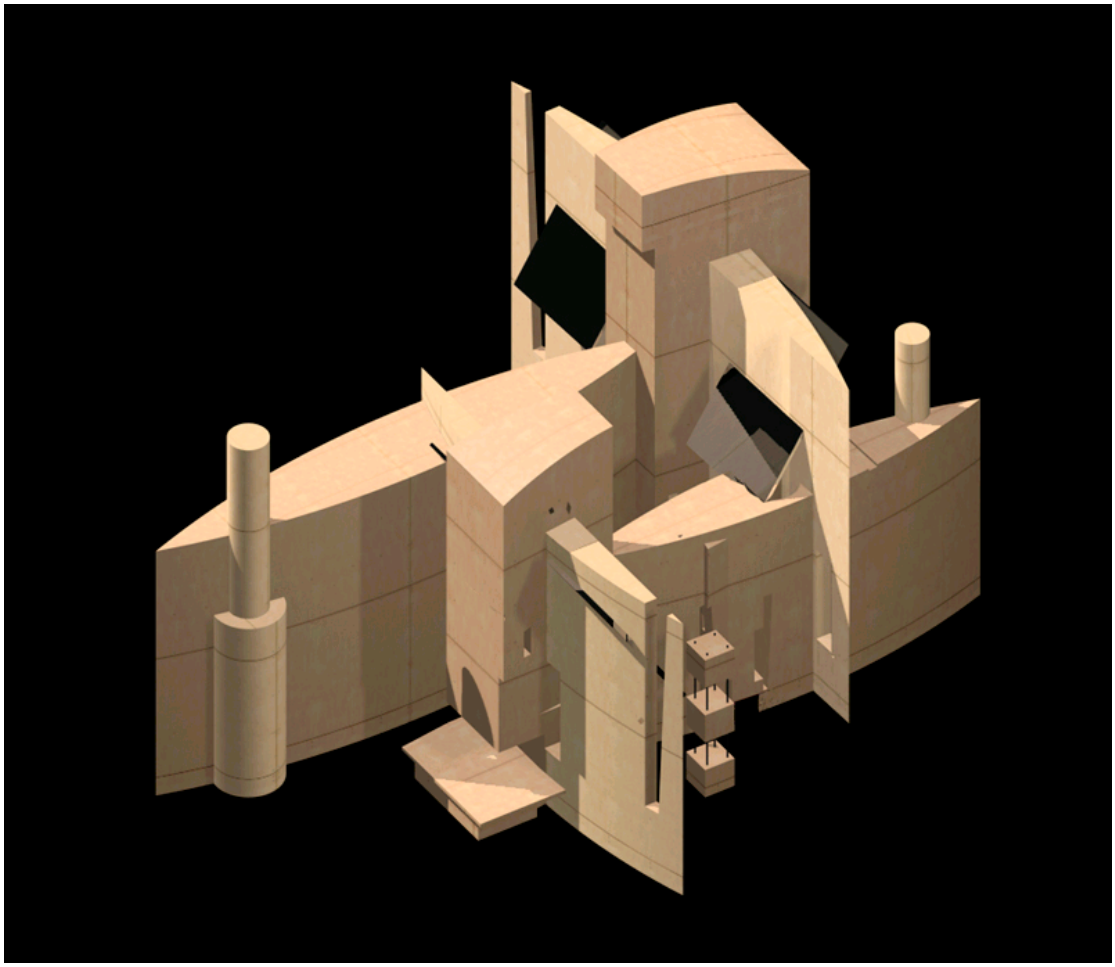


Fig. 13. NXIO GESTATIO Design Lab. *The Cloud Harp.* 1997. “Computer model of the New York / Pittsburgh / Montreal Cloud Harp architectural structure”.

time are also housed in this structure.

As may be deduced from the technical details given on the project web site, *The Cloud Harp* is an integrated art work that draws on various technologies and sciences, such as MIDI, Architecture, Computer Science, Mathematics and Metrology. *The Cloud Harp* has been installed in three public locations on separate occasions[24]. The public is thus invited to engage with the work in situ. To hear the cloud song, the viewer enters the erected structure and hears the sound made from the clouds directly above it. (Reeves 'The Architecture'). The viewer is therefore aware of the real-time quality of the work and may also look to the heavens[25] and see the clouds that cause the sound in real time. In so doing, the participant is encouraged to simultaniously perceive a visible and somewhat nostalgic natural phenomenon in a different way.

The Natural Sublime

Both these case studies use data gleaned directly from natural phenomena in real time, from phenomena that are thereby part of the installation. In this way, the data translation and the real experience of the phenomena are simultaneous for the participant.

This simultaneous negotiation can be viewed as a product of the digital age, just as science-based digital communication technologies have become ingrained in everyday life. However, in this instance it becomes the task specifically of the participants, through their experience with the installation, to bridge the cognitive gap

[24] New York, Pittsburgh and Montreal.
[25] The installation structures had upward-tilting mirrors installed in them, as can be seen in Fig.13.

between the two. This gap lies between the personal first-hand engagement with the phenomena and the art work's interpretation of the phenomena's data to an aesthetic end. I will try to show that it is at this cognitive bridging, so to speak, between the natural and the digital that the interactive design places the participant at a point where the art works successfully evoke sentiments of the sublime through user participation. In much the same manner as happens with *Listening Post,* these works additionally rely somewhat on the failure of technology to succesfuly re-present or mirror the participant's experience to evoke the sublime.

My interest does not lie in the functional details and associated issues of digital translation from natural phenomena to the data that occurs in these case studies. Rather, my concern is with natural phenomena being represented through digital art in real time, and successfully evoking sentiments of the sublime in the participant. This process, as with *Listening Post,* is only successful when it overcomes the limitations of working with a client. I believe that both these case studies – *Grower* and *Cloud Harp* – in their design are not hindered by the limitations of the client, as both works appropriately address the client in their installation and the data does not lose its subjective meaning for the sake of clarity. I will focus, therefore, more on the participatory engagement of the viewer with the art work's design.

When referring to phenomena in nature – especially where the notion of the sublime is concerned – there is, because of the notion's history, an association with the Romantic sublime. The Romantic arts have been heralded as presenting otherworldly or fearful elements associated with nature as a means of evoking the notion through representation. Romanticism is also known for encouraging a first-

hand mimetic interpretation of the experience with natural phenomena. By evoking the sublime, Romanticism attempted to maintain the importance of an inherent metaphysical relationship between humanity and nature. Romanticism is the only movement in art and phillisophical history that truly associates the notion of the sublime with natural phenomena.

When looking at Lyotard's interpretation of the sublime, we can see that he describes modern art works as attempting to present sentiments of the sublime by presenting images that allude negatively to that which is un-presentable. The case studies considered here do not conform to this, in that first-hand experience of the phenomena and abstract presentation of the same phenomena through the art work are simultaneous. Creating a new form of engagement.

There are a number of points here that identify this new form of engagement as associated with the notion of the sublime in the case studies considered here. In data capture and its interpretation through the client, these two art works are acting as science does in Biophilia, exposing details not available in the ordinary observation of phenomena, and thereby heightening the aesthetic attraction to the natural. Human faculties are here exposed as being limited and reliant on technologies for this heightening, which assists in the evocation of the notion of the sublime in the Kantian reading and in the participant as subject. The participants become aware of the limitations of their senses, and there is a sense of awe to be experienced in the complexity revealed by the technologies. This is not an experience of the technological sublime, as the limitations are found in all human senses and it is not a matter of knowledge, although there are clear similarities. The art installations create an engaging experience between the technologies, the phenomena and the individual. This assists in creating allusions to the sublime, a sublime that is strongly linked to the fear-ridden experience identified by Burke and

Kant, where human physicality is under threat by being defined as limited. Lyotard would regard this as a Postmodern sublime, in other words an allusion to that which cannot be represented, in an act of breaking pre-established language games through the use of new forms.

So far I have sought to establish that the two installations show the sentiments of both the Romantic and the Postmodern sublime, purely through the nature of the installation. I will now look at the two case studies separately, to examine how each may seperatly evoke sentiments of the sublime in the participant.

Even though there are similarities in the two case studies presented in this chapter, I have chosen to address them because they are significantly different; each has a very different origin in artistic intention and conceptual approach. The different sources and artistic interpretations of the data reveal two very different art works that reflect, in their own capacities, different associations with the sublime. Sabrina Raaf's *Grower,* has its origins in modern sciences and what could be regarded as general knowledge. Its evocativeness lies in a process of participants' self-awareness. This process is in turn associated with the Kantian and Burkian sublime and the attribute of obscurity. *The Cloud Harp,* on the other hand, is influenced by older processes that address the classical links between science and art, and its evocative qualities are rooted in the associations with desired unity between nature and humanity.

Evocation through Personal Experience in 'Grower'

The notion of the sublime in Romanticism was, to some extent, to be seen in Burke's 'attributes' of the sublime, centred on obscurity. Obscurity epitomises the degree of separation experienced between reason and a frightening or metaphysical

experience, defined as sublime by both Kant and Burke. This is why representation could evoke sentiments of the sublime through devices such as non-representation. We can also see that it was for these reasons that the Romantics believed that something would be lost in the over-simplification of nature by the empirical sciences. However, through Lyotard's Postmodern model – paralogy – we have seen that there is a great deal that cannot be totally defined by science.

In *Grower* the participants are put in a position where they are literally in the midst of the phenomenon in question, namely breathing out the CO_2 that negotiates the art work. Yet despite the proximity of the phenomenon, the participants cannot by their own senses grasp the specifics of the phenomenon, as presented to them. We can identify that the shift for interactive digital art works of this nature is that the participants, through environmental sensors, are being made aware of a phenomenon they would ordinarily be unable to perceive but are never-the-less in close proximity to. Because of this the participant's interpretation of the work becomes cognitive relying on the imagination, and the experience of the sublime shifts from an astonishing emotion to a that is strangely cognitive.

In *Grower*, the imagination and reason are engaged simultaneously and can be equated with the 'internal dialogue' found in Kant's theory of the sublime. Kant stated that the sublime is what is forcibly manifested between the ego and the senses. Yet with technology-aided perception in this installation, the gap between the ego and the senses becomes greater. This is due to the discrepancy between what is 'known' through reason and the imagination, and what is known through natural experiential perception.

Experience with the installation reveals the robot as an entity in its own right which, as Raaf suggests, 'nests' the space. Thus the art object, through its actions,

takes ownership of the space. The art object is animate but the participant is intimately responsible for this animation. Participants see the product of their presence through this process; as the CO_2 exhaled is digitally quantified and visualy represented on the gallery walls. Engagement through the art work is not only with the natural phenomenon and the digital representation of it, but with a representation of self. The interaction design allows for an intimate experience with technology (the art object) and a heightened perception of the natural phenomenon, which then culminates in a negotiation of the participant's presence between the two.

Grower does not function in the same way as *Listening Post*, in which the flow of data through the client from the server is seen to be both overwhelming and limitless. In this case *Grow*er does not put forward the data as sublime, but rather puts forward the CO_2 as possibly limitless. In this sense *Grower* does not show what Ostrowski refers to as the 'anxiety of the client' in relation to the server, but rather the 'anxiety of the client' in relation to humanity's intimate relationship with nature.

Grower's specific interaction design cannot be considered as an object of the technological sublime as identified by Nye. Objects with attributes of the technological sublime were never pitched against the natural sublime, but were regarded as sublime for their particular technological attributes. Neither can *Grower* be addressed as an object associated with the Romantic sublime as, apart from the unknown extent of the CO_2, Burke's extensive attributes of the sublime cannot be identified in this art object because it is not physically extensive in any way. This clearly sets *Grower* apart, as it engages the cognitive imagination rather than the senses of the participant. Since there is not yet a definition for this, we can attempt to view the work through the eyes of Lyotard and the Postmodern sublime, and use *Grower* as a model for a new approach to interactive digital art that uses data from natural phenomena that can evoke sentiments of the sublime. We can begin to

understand *Grower* as an art work that creates a subtle experience between what can be presented and what cannot be. We also begin to understand that it is the interaction design itself that creates the potential for evoking the the sublime in the participant.

Grower uses (first world) general knowledge as a device in this experience: we breathe in oxygen and breathe out CO_2; CO_2 helps plants grow; thus the 'grass' is 'growing' because of the CO_2. This is a functional and nostalgic presention of what cannot be percieved by the senses. What is not percieved, however, is doubled in *Grower*: Firstly, the art object is programmed and assisted by general knowledge to have an outcome that refers nostalgically to a naturally-occurring phenomenon, a complex process that has proven difficult to represent and that can be referred to as life. Secondly, the art object engages the participant in a physical experience between CO_2 and the missing natural life, and in this way heightens the participants awareness of the inherent natural relationship between them and nature. The participants in *Grower* are made immediately aware of the phenomenon of CO_2, a phenomenon that they have an active part in creating. This nostalgic presentation in *Grower* makes the participant aware that CO_2 acts as part of a life cycle and if any part of the cycle is removed, then the system fails. Therefore the installation creates the situation where this cycle is recreated, but part of it is artificial: the participant is then unintentionally contributing to a playful and synthetic representation of growth[26]. This heightens the importance of the participants presence in the installation space and brings them a sense of pleasure. The pain Lyotard refers to in the Modernist notion of the sublime appear where the technological object cannot complete the 'life cycle' represented.

[26] Raaf's written intention for her work is that the 'grass' is reflective of the survival of art galleries relying on audience numbers. However, my interpretation of the piece is that it serves as an integrated interaction with the viewer; the growth could be equated with any number of scenarios that rely on human interaction. It is the experience of self-reflection, not her stated meaning, that I am addressing with regard to her work.

Let us recapitulate this analysis of the sentiments of the sublime in *Grower*:

- Firstly, due to the juxtaposition of present but invisible natural phenomenon and its interpretation as data, a gap between the ego and the senses is revealed, creating for the participant a discrepency.
- Secondly, this discrepancy is further enlarged by the fact that *Grower,* as a piece of technology, is attempting playfully to recreate a the process of life. This reveals the failure of reason (technology) to represent that which cannot be represented. This can only be alluded to nostalgically through the green lines representing grass and in the action of breathing that maintains the art work.
- Thirdly, in this process the participant becomes self-aware through the visual presentation of the process. The visual representation alludes to his breath, and an intimacy is formed and heightened through an enforced cognitive and physical bridge between personal experience and technological representation.

It is through these three aspects that the notion of the sublime is evoked in the participant. The process presents a heightened feeling of obscurity in regards to the human senses but also heightens the distance between human reason and natural phenomena. It establishes a sense of intimacy with nature and a distinct sense of self-awareness through an enforced participatory process. All this can be described as a new form of evocation of the sublime.

Lyotard claims regarding the sublime that the observer as subject "develops a conflict between the faculties of the subject, the faculty to conceive something and the faculty to 'present' something". We can see that the experience with the *Grower* is not what Burke would regard as an awe-inspiring sublime experience, but it does create what Lyotard would see as a Postmodern allusion to the sublime. Not only

does the work challenge the limits of technology, but it refers to the notion of the sublime through the creation of an experience in which the un-presentable is experienced rather than presented.

An Experience of Relational Physicality in 'The Cloud Harp'

We have seen, in the discussions about the Neo-Classical and Romantic notions of sublime, that there is a relationship between the notion of the sublime and classical 'sciences' such as astrology, geometry and alchemy. This relationship in Neo-Classicism was regarded as an intellectual superiority over nature, but also as representing a divine luminous unity. It is therefore not surprising that the makers of *The Cloud Harp* associate the work (in a somewhat nostalgic gesture) with the transposition of music in Kepler's concept of the 'Music of the Spheres'. Kepler understood the 'Music of the Spheres' to be an intellectual affinity between the universe (the planets) and man, expressed mathematically through the rules of Western music. I believe that the association of *The Cloud Harp* with this classical concept shows in particular a desired aesthetic affinity between nature and humanity; an attempt to reclaim a relationship of luminous unity bridged in sound by means of technology.

The Cloud Harp cleverly uses the structure of clouds as a compositional tool to create music, which as an art work inspires both awe and pleasure. *The Cloud Harp* creates a cognitive experience, not unlike the experience with *Grower*, where the participant is invited to engage aesthetically with a natural phenomenon and its aesthetic interpretation through the installation. It is for this reason that the use of cloud data as a compositional tool is not problematic in the art work, but in fact assists in heightening the possibility of the evocation of the sublime.

Unlike *Grower*, however, the natural phenomenon from which data is being sourced in real-time in *The Cloud Harp* is not in very close proximity to the participant, and is not identified as a part of a cycle in which the observer participates. Rather, the clouds far above are considered 'objects' that are ever-present yet out of reach. It is this that creates a general nostalgia for clouds in most humans. Watching clouds is considered pleasurable: they have a picturesque quality and the fact that they are out of reach makes them nostalgically desirable. They also represent the cyclical and predictable eternity to be found in nature.

In *The Cloud Harp* the participant is able to hear sounds that are created by the composition of the clouds directly above, by means of a playful installation that sets the stage for a pleasurable interaction evoking both awe and pleasure. The cloud structure creates a data set that is always changing and unpredictable. This data, as a subjective whole, is inconceivable to the participant but represents, in analytical form, a unique signature of cloud behaviour. It is this unique signature that heightens the observer's interest in the music that is composed from the data. It is a completely uncontrolled composition, and the participant finds pleasure in hearing the song of the clouds playing through recognisable sounds (samples). In many ways this is like hearing the song of another entity; this in itself is intriguing and awe-inspiring. It is also awe-inspiring because, without the technologies, this song would not be possible. *The Cloud Harp* can be understood as an object of the technological sublime, as it is the technology that brings us closer to a natural phenomenon that is generally 'out of reach'. Therefore *The Cloud Harp* is different from *Grower* in that the use of technology itself is clearly celebrated.

Yet there is a gap between what is shown and heard in the installation and what the participant from the ground understands about the phenomenon of clouds

from a personal point of view. It is in this gap that the true evocation of the notion of the sublime is to be found. Just as happens with *Grower*, this evocation relies on the participant's conscious participation in the functioning of the installation. *The Cloud Harp*, however, relies more heavily on the differences in perception between a digital and aesthetic interpretation of cloud data and how the participant personally and nostalgically perceives the clouds themselves. This creates a feeling of relational physicality on the part of the participant. In this way the work is not purely a work of the technological sublime, but engages the participant in an abstract aesthetic that challenges his perception of the engaged natural phenomenon. This, however, unlike what happens with *Grower*, does not show the limitations of technology; rather it only heightens the difference between the natural phenomenon and the technology.

Let us recapitulate. The installation, as a consequence of its situation, creates in the participant a feeling of relational physicality, which is heightened by a nostalgic relationship to clouds. This heightened discrepancy is strongly associated with the Romantic sublime, where the pain is in the failure of the imagination to bridge the gap between the nostalgic and the rational, and the pleasure lies in the solace of the soundscapes and the architectural structure. *The Cloud Harp* puts the participant in a position in which both the natural phenomenon and the engaged technology evoke sentiments of the sublime. The abstractions created by digital interpretation in both the architectural structure and the sounds are only abstractions through which the participant not only re-engages with the natural phenomenon, but is also made very aware of his physicality as it relates to both the cloud and the technology.

The 'Thing' Which We Cannot Create

With regard to what in *The Cloud Harp* is seen to be a desired unity with nature, and in *Grower* to be a clear indication that there is a gap between what cannot be presented and the installation, I would like here to introduce a concept related to Lyotard's Postmodernist notion of the sublime. This concept identifies the vastly different evocations of the notion of the sublime in each of these case studies as being distinctly similar in a way that has not yet been discussed, and helps to reach some conclusion about the sublime sentiments in these works.

Lyotard claims in The Postmodern Condition: A Report on Knowlage:

> ... modern aesthetics is an aesthetics of the sublime, though a nostalgic one. It allows the unpresentable to be put forward only as the missing contents; but the form, because of its recognizable consistency, continues to offer the reader or viewer matter for solace and pleasure.
>
> [Regarding nostalgia] These sentiments do not constitute the real sublime sentiment, which is an intrinsic combination of pleasure and pain: the pleasure that reason should exceed all presentation, the pain that imagination or sensibility should not be equal to the concept. (80 - 81)

We can see evidence of this as instances of the sublime in the two works being considered as case studies here. This could be seen as both Modern and Postmodern, and the distinction between the Modern form and the Postmodern forms in the art works follows a very fine line due to the inventive use of technology. *Grower* and *The Cloud Harp* both show the non-presentation and nostalgic characteristics

suggested above. Yet there is an intrinsic combination of pleasure and pain evoked through interaction in both works, which pertains more to the Postmodern form.

Emily Lutzker's paper 'Ethics of the Sublime in Postmodern Culture', is concerned with Lyotard's Postmodern understanding of the notion of the sublime. Lutzker adds insight to this and interprets the sublime in Postmodernism as being representative of the 'Other' (3). She claims the following:

> …the gap between being human, with all of our human abilities, and the Thing which we cannot create, is the sublime. The gap is manifested in our imagination, in our ability to sustain this contradiction, with no expectations of sadness or joy in our non-absolute (mortal) Being. No representation of the sublime Thing can adequately present that feeling. But the sublime then becomes an object in which we can experience this very impossibility, this permanent failure of the representation to reach after the Thing. (3)

Furthermore, Lutzker goes on to state:

> The pure implication of something - without it being shown, is not in itself enough to generate the sublime. This is not a "failure of representation" it is only a narrative device. The gap between what is being shown (occurring within our reason) and what is happening (a manifestation of imagination) is the sublime. The mere use of a device to suggest something, could be a means to this, … (1)

We can understand is that, for each of the case studies examined here[27], the interaction design and the technology object (art work) are the 'narrative device' that Lutzker speaks of. Whether the experience thus created is one of heightened

[27] *Listening Post, Grower* and *The Cloud Harp*

awareness, intimacy with nature or one of a heightened feeling of relational physicality, we have seen that this experience is a necessary device to evoke the sublime in the participant. It arises from the notion that the sublime, as Lutzker states, "…becomes an object in which we can experience this very impossibility, this permanent failure of the representation to reach after the Thing."

Conclusion

The evocation of the sublime in the case studies considered here lies between personal experience and the technological interpretation of the natural phenomena in question. This experience is created through interaction design. This design is integral to the art object created through technology, which places the participant between the exercise of reason and the observation of the phenomenon. It is through this experience that the sublime is evoked in user participation.

The art works as objects of technology are, in essence, a digital processing of data. This allows us to attempt intellectually to align ourselves with something outside of ourselves. This digital interpretation is the circumstance of as well as being inherent in our age. Today's digitally- and globally-oriented society generally looks at nature through the lens of science. Modern science as mentioned by Nye acts as a tool for revelation and education. Biophilia shows an aesthetic engagement with the scientific exploration of nature. We have also seen that techno-science is used as a tool digitally to emulate nature, demonstrating that the digital emulation of nature undermines sublime nature, as it only simplifies nature. Here awe and fascination are only temporary and soon become redundant due to the nature of technology. Real sublime sentiment therefore exposes the failure of reason to show the mystical, the transpersonal the all that the notion of the sublime represents.

We saw in *Listening Post* that the correct use of technology, along with the avoidance of definition and therefore simplification, can be used as a tool in achieving the successful evocation of the sublime where technology is the medium. The last two case studies addressed are also successful in this, as they do not attempt to define the natural phenomena, only to present their qualities through the

sourcing of real-time data. As with De Maria's *Lightning Field*, these case studies appeal to formal parameters (in these cases, data) that assist in revealing the notion of the sublime by acting as a counterpoint to the unknown, unpredictable and un-representable.

We discovered that the sublime evokes (as a transpersonal experience) inherent feelings of pleasure and pain simultaneously in the participant. These feelings, according to Kant, are the result of a confrontation between the senses and reason, between knowing and not being able to present. For Lutzker this is seen to be the gap between "being human with all our human abilities" (namely science, technology and art in this case) and the 'Thing' which we cannot create. This gap, she claims, is "manifested in our imagination" and no representation can embody the contradiction.

The state evoked by the natural sublime is strongly associated with the metaphysical and the eternal; it is certainly not something we can create. The state evoked by the technological sublime is temporary, looks only towards the future and, as Nye states, separates those who create technology and those who do not. The evocation of the sublime in the last two case studies, however, is a contradictory state between the natural sublime and the technological sublime that alludes positively to the attributes of the former. This contradictory state validates Lutzer's claim that the sublime is the thing that we cannot create: "the gap is manifested in our imagination, in our ability to sustain this contradiction, with no expectations of sadness or joy in our non-absolute (mortal) Being …the sublime then becomes an object in which we can experience this very impossibility".

The notion of the sublime, as appropriated by Lyotard, is an aesthetic category with the potential to challenge Modernist norms. In attempting to present

that which cannot be presented, or create what cannot be created, Lyotard believes that we are challenged to look outside the totalitarian rules established by Modernism. We have seen aspects of Lyotard's theory in *Lightning Field* and *Listening Post*; in not attempting to define the unknown and the unpredictable and in simply creating parameters within which the sublime qualities of the phenomena can present themselves. We see in both these works of art the use of formal structure as constituting parameters. We have also proved that these parameters aid the evocation of the notion of the sublime because a contradiction is created – a contradiction that is identified by both Kant and Lutzker. Setting the idea of the sublime against definitive parameters allows the sublime to be recognised. This reiteration in *Lightning Field* is the juxtaposition of units of measure against the powerful and unpredictable phenomenon of lightning. In *Listening Post* reiteration makes use of a client system that is designed for surveillance, but has been 'broken' to show only a fleeting impression of an infinite amount of data.

Much the same methods have been used in *Grower* and *The Cloud Harp*. These two installations particularly engage the viewer by requiring participation, more so than do *Lightning Field* and *Listening Post*. This engagement places the participant in a position where his experience emphasises the gap between the two juxtaposing elements of the installations, in the case of *Grower*, as a robotic arm drawing a representation of grass, which is in fact a representation of the participants' breath in *Grower*. Synthetic representation is thus juxtaposed to human breathing. In *The Cloud Harp,* a digitally abstracted cloudscape is juxtaposed to the simultaneous experience of the naturally-occurring cloudscape. This, as already mentioned, evokes feelings and emotions associated with the sublime in the participant, causing him both pleasure and pain through the particular juxtaposition of the natural and the technological.

As I have demonstrated in this thesis, the evocation of real sublime sentiment is possible through works of art that engage technology as a medium, in a manner that reflects Lyotard's Postmodern sublime and is undoubtedly heightened by the presence of nature. In *Grower* and *The Cloud Harp* (and to some extent in *Lightning Field* and *Listening Post*) we can see a new way of evoking the notion of the sublime in the arts. This is as an experience and relies on both the presence of science and technology (reason) and of a natural phenomenon. Lutzker's argument, that the gap between ourselves and the 'Thing' which we cannot create is in fact 'the sublime', revealing that, despite our attempts at reason and the definition of things, the sublime is still a notion that will eternally represent the un-presentable and the immense desire to define that one thing that we cannot. This is evoked through interactive digital art in the fine juxtoposition of definition and non-definition and the creation of an interactive experience.

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