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If the concept of the sublime had previously been used to articulate the inadequacy that the human subject felt upon trying to represent Nature, the postmodern condition – in which Nature itself has been effaced – has produced a sense of the sublime in which humans find themselves up against their own creations.

Dale Chapman

Since its emergence as a specific discipline within philosophy in the middle of the eighteenth century,¹ the history of aesthetics shows two remarkable tendencies, reflecting specific developments within (post)modern art and culture as a whole. On the one hand, the development of aesthetics is characterized by an impressive differentiation and multiplication of aesthetic categories. Whereas early aesthetics was predominantly focused on the category of beauty, since the beginning of the nineteenth century until now a wide range of new aesthetic concepts have emerged, such as the sublime, the ironic, the comic, the absurd, and the banal. Without doubt this development reflects developments in modern art itself, which has restlessly expanded the domain of aesthetic experience and expression. The fine arts became the no-longer-fine-arts.

The second tendency has also to do with another type of expansion which characterizes modern aesthetics. At least since the Romantic Movement there is a tendency to comprehend aesthetic experience as a, and sometimes even *the*, fundamental type of human experience. Here again, the history of modern art has played a crucial role in this development. Following the revolutionary spirit of the early-romantic movements, the artistic avant-gardes of the twentieth century aimed at a fundamental ‘aesthetization’ of the world and at a transformation of human life into a work of art (De Mul 1999: 8f.). In this way the no-longer-fine-arts ultimately became no-longer-artistic-arts. This implies for aesthetics that everything becomes an object for aesthetic interpretation. The domain of aesthetics is no longer restricted to the aesthetic dimension of nature (‘natural beauty’) and specific cultural artifacts (‘artistic beauty’), but covers the world and human life as a whole.

In this contribution I want to investigate a phenomenon that is located at the crossroad of these two tendencies: the technological sublime. Although the category of the sublime has a long history, it became a dominant concept in nineteenth and twentieth-century aesthetics. In (post)modern culture however, we witness a fundamental transformation of the experience of the sublime. Although originally the concept of the sublime predominantly referred to a specific rhetoric effect, in the nineteenth century the sublime became strongly connected with the

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artistic representation of overwhelming phenomena in nature. I will argue that over the course of the twentieth century, the sublime increasingly becomes entangled with the experience of technology. At first, we seem to witness here a return of the sublime from nature to technology, even though the point of departure was an alpha-technology (rhetoric), whereas the return concerns the domain of beta-technologies, such as nuclear physics and information technology. In the age of biotechnologies (such as genetic modification and synthetic biology), however, the sublime seems to regain a natural dimension. Mediated by biotechnologies nature becomes a 'second' or 'next nature': 'With our attempts to cultivate nature, humankind causes the rising of a next nature, which is wild and unpredictable as ever. Wild systems, genetic surprises, autonomous machinery and splendidly beautiful black flowers. Nature changes along with us.'² As such, next nature provides a specific, so far unknown experience of the sublime: the technological sublime.

Before investigating the technological sublime in more detail, I will give a concise overview of the history of the concept of the sublime. This will enable us to demarcate both the continuity and discontinuity of the technological sublime.

The classical sublime

When we call a landscape or a piece of art 'sublime', we express the fact that it evokes particular beauty or excellence. Note that the 'sublime' is not only an aesthetic characterization; a moral action of high standing or an unparalleled goal in a soccer game may also be called 'sublime'. Roughly speaking, the sublime is something that exceeds the ordinary. This aspect of its meaning is expressed aptly in the German word for the sublime: *das Erhabene* (the 'exalted'). In the latter term we also hear echoes of the religious connotation of the concept. The sublime confronts us with that which exceeds our very understanding.

As already noticed, the notion of the sublime goes back a long way. The word 'sublime' first appears in Middle English in the fourteenth century. It was probably derived from the Middle French 'sublimier', which has its root in the Medieval Latin *sublimare* (to refine) and, further back in time, in the Latin *sublimis* (high up in the air). Used more figuratively as an adjective, it means 'lofty' or 'grand'.³ One of the oldest essays on the sublime dates back to the beginning of our calendar. It is a manuscript in Greek entitled Περὶ ὑψους (*On the Sublime*), long ascribed to Longinus, though probably incorrectly so. In this treatise, the author does not provide a definition for 'the sublime', and some classicists even doubt whether 'the sublime' is even the correct translation of the Greek word used – ὑψος.⁴ Using a number of quotes from classical literature, the author discusses fortunate and less fortunate examples of the artistic evocation of the sublime. For one, the sublime must address grand and important subjects and be associated with powerful emotions. For (pseudo)Longinus, the sublime landscape even touches upon the divine. Nature 'has implanted in our souls an unconquerable passion for all that is great and for all that is more divine than ourselves' (Longinus 1965, 146).

The early-modern sublime

Longinus' essay was hardly noticed by his contemporaries and, in the centuries that followed, we rarely find references to this text. The essay was printed for the first time as late as 1554 in Basel. But only after the French translation by Boileau (1674) and the English translation by Smith (1739) did the text begin its victory march through European cultural history. From the Baroque period onward, culminating in Romanticism, the sublime grew to become *the* central aesthetic concept, at

which time it was often associated with the experience of nature. In the eighteenth century, for example, we find it predominantly in the descriptions of nature of a number of British authors, portrayals of their impressions collected on Grand Tours through Europe and the Alps (a common practice in those days among young people from prosperous families). These authors use the term to render the often fear-inducing immensity of the mountain landscape in words. The landscape gives them, as John Dennis already puts it in his *Miscellanies*, ‘a pleasure mingled with Horrors’ (1939–1943: 350).

Basically, in early modernity the sublime refers to the wild, unbounded grandeur of nature, which is thus contrasted starkly with the more harmonious experience of beauty. In *A Philosophical Inquiry into the Origin of Our Ideas of the Sublime and Beautiful* (1756), Edmund Burke defines the sublime as a ‘delightful terror’ (1998: 101–102) That the forces of nature may nevertheless leave the viewer in a state of ecstasy is connected with the fact that the viewer observes these forces from a safe distance.

The romantic sublime

In German Romanticism, however, the sublime loses its innocent character. The work of Immanuel Kant has been of particular critical importance in this respect. In his *Kritik der Urteilskraft* (Critique of Judgment, 1790), Kant, following Burke, makes an explicit distinction between the beautiful (*das Schöne*) and the sublime (*das Erhabene*). Beautiful are those things that give us a pleasant feeling. They fill us with desire because they seem to confirm our hope that we are living in a harmonious and purposeful world. A beautiful sunrise, for instance, gives us the impression that life is not that bad, really. The sublime, on the other hand, is connected with experiences that upset our hopes for harmony. It is evoked by things that surpass our understanding and our imagination due to their unbounded, excessive, or chaotic character (Kant 1968: B74). Moreover, the sublime cannot be expressed in a (necessarily limited) sensuous form:

For the sublime, in the strict sense of the word, cannot be contained in any sensuous form, but rather concerns ideas of reason, which, although no adequate presentation of them is possible, may be excited and called into the mind by that very inadequacy itself which does admit of sensuous presentation. Thus the broad ocean agitated by storms cannot be called sublime. Its aspect is horrible, and one must have stored one’s mind in advance with a rich stock of ideas, if such an intuition is to raise it to the pitch of a feeling which is itself sublime – sublime because the mind has been incited to abandon sensibility and employ itself upon ideas involving higher finality. (Kant 1968: B77)

Kant makes a further distinction between the mathematical sublime and the dynamic sublime. The first, the mathematical sublime, is evoked by that which is immeasurable and colossal, and pertains to the idea of infinitude. When we view the immensity of a mountain landscape or look up at the vast night sky, we are overcome by a realization of our insignificance and finitude. Kant associates the second, the dynamic sublime, with the superior forces of nature. The examples he uses include volcanic eruptions, earthquakes, and turbulent oceans. Again, these phenomena are not sublime as such, but they might evoke the sublime in us. Just as in the case of the mathematical sublime, we experience our insignificance and finitude, but in these cases this understanding is supplemented by the realization that we could be destroyed by the devastating power of these forces of nature. Kant calls the dynamic sublime ‘*ungeheuer*’, which we could translate as ‘enormous’ or ‘monstrous’: it evokes both awe and fear. It induces a ‘negative lust’ (Kant 1968: B76) in which attraction and repulsion melt into one ambiguous experience.

Since the sublime, in spite of its moral connotations, remains primarily an aesthetic category in Kant's work, he maintains the idea that 'safe distance' characterizes the experience of the sublime. When viewing a painting of a turbulent storm at sea, one can contemplate the superior force of nature while remaining comfortably assured that one is safely in a museum and not at the stormy sea depicted! Friedrich Schiller, in contrast, takes things one step further and 'liberates' the sublime from the safe cocoon of aesthetic experience. The political terror under Jacobin rule following the French Revolution had deeply impressed him and shaped his view of the sublime, as elaborated in a series of essays.

In order to accomplish this liberation, Schiller rephrases Kant's distinction between the mathematical sublime and the dynamic sublime. In a 1793 text on the concept of the sublime, Schiller argues that the mathematical sublime ought to be labelled the theoretical sublime. The immeasurable magnitude of the high mountains and the night sky evoke in us a purely *reflexive* observation of infinitude. When nature shows itself to be a destructive force, on the other hand, we *experience* a practical sublime, which affects us directly in our instinct for self-preservation. Still, in Schiller's view, we need to make yet another distinction. When we view life-threatening forces from a safe distance – for instance, by observing a storm at sea from a safe place on land – we might experience the grandeur of the storm, but not its sublime character. An experience can only be truly sublime when our lives are actually endangered by the superior forces of nature.

And yet, for Schiller, even that is not enough. Human beings have an understandable urge to shield themselves both physically and morally from the superior forces of nature. Dutchmen who protect their country by building dykes attempt to gain 'physical certainty' over the violence of a westerly gale; those who believe their soul will live on in heaven after death protect themselves by means of 'moral certainty'. Whoever truly manages to conquer his fear of the sea, or of death, shows his grandness, but loses the experience of the sublime. According to Schiller, truly sublime is he who collapses in a glorious battle against the superior powers of nature or military violence: 'One can show oneself to be great in times of good fortune, but one only can be sublime in times of bad fortune' ('Groß kann man sich im Glück, erhaben nur im Unglück zeigen', Schiller 1962, B. 5: 502). Schiller's work transforms the sublime from an ambiguous aesthetic category into a no less ambiguous category of life.

The technological sublime

History doesn't stop, however. Over the nineteenth and twentieth centuries, the main site for the ambiguous experience of the sublime has gradually shifted *from nature to technology*. Our current period is viewed as the age of secularization. God is retreating from nature and nature is gradually becoming 'disenchanted' (*entzaubert*) in the process. Nature no longer implants in us, as was the case in Longinus's time, 'an unconquerable passion for all that is great and for all that is more divine than ourselves', but invites technical action and control. Divine rule has become the work of man. The power of divine nature has been transferred to the power of human technology. In a sense, the sublime now returns to what it was in Longinus's work: a form of human *technè*. However, these days it no longer falls into the category of the alpha-technologies, such as rhetoric, but rather, we find ourselves on the brink of the age of sublime beta-technologies. Modern man is less and less willing to be overpowered by nature; instead, he vigorously takes technological command of nature.

Today the human impact on our planet can hardly be underestimated. Climate change, population explosion, genetic manipulation, digital networks, plastic islands floating in the oceans. Untouched old

nature is almost nowhere to be found. ‘We were here’, is written all over. We are living in a time of rainbow tulips, palm-shaped islands, hurricane control and engineered microbes. An age in which the ‘made’ and the ‘born’ are fusing. (Van Mensvoort sd)

As David Nye has documented in great detail in his book, *American Technological Sublime* (1994), modern Americans initially embraced the technological sublime with as much enthusiasm as they had embraced the natural sublime. The admiration of the natural sublime, as it might be experienced in the Grand Canyon, was replaced by the sublimity of the factory, the sublimity of the skyscraper and the metropolis, the sublimity of aviation and auto-mobility, and the sublimity of war machinery. Talking about the electrical sublime he claims that

the electrified landscape’s meaning lays precisely in the fact that it seemed to go beyond any known codification, becoming unutterable and ungraspable in its extent and complexity. [...] The city as a whole seemed a jumble of layers, angles, and impossible proportions; it had become a vibrating, indeterminate text that tantalized the eyes and yielded to no definitive reading. (Nye 1994: 196)

Of all the technologies the computer in particular discloses a whole new range of sublime experiences. In order to understand the nature of the sublimity of information and communication technologies, we should first of all realize that the crucial element of every computer program is some sort of *database*. In a basic sense, the word ‘database’ may refer to any collection of items that is ordered in one way or another, be it a bookshelf with a collection of alphabetically ordered books or a card index box with a series of cards with names, addresses and telephone numbers. In computing, too, a database is a structured collection of data records. However, in this case the records are stored in computer memory, so that a software program can consult it to answer queries. With the help of the four basic operations of the database – the ‘ABCD of computing’: Add, Browse, Change, and Destroy – in principle all possible combinations of data can be created. Database ontology is dynamic because the growing number of elements is constantly combined, decomposed, and recombined (De Mul 2009).

Database applications virtually span the entire range of computer software, ranging from main-frame databases for administrative purposes and multimedia encyclopedias on the internet, to search engines, wikis and other Web 2.0 applications. In a world in which the computer has become the dominant technology, everything – genes, books, organizations – becomes a relational database. Databases transform everything into a collection of (re)combinatory elements. In this sense databases have become the dominant ‘cultural form’ of our age (Manovich 2002: 219). Computers are ‘ontological machines’ that shape both our world and our worldview. As such, the database also transforms our experience of the sublime.

Theoretical and practical sublimity in the computer age

Keeping Kant’s distinction between the mathematical and the dynamical sublime in mind, we might also distinguish between mathematical and dynamical sublimity in computer technologies. The *mathematical sublime* in computing manifests itself as a combinatorial explosion. As Borges has shown in *The Library of Babel* (1941), the number of possible combinations of a finite number of elements – in his story, the twenty-five orthographic symbols of the alphabet – is mind-boggling (Borges 1962). The ‘protagonist’ in Borges’ story is a Library, consisting of a huge collection of books, each book contains four hundred and ten pages; each page, forty lines, each line, eighty black letters. This means that each book contains 1,312,000 symbols. The narrator tells us that the

Library is ‘total’ (perfect, complete and whole), because the bookshelves contain all possible combinations of the twenty-five available symbols. This makes the number of books in the library hyper-astronomical, as it contains no less than $25^{1,312,000}$ books. The number of atoms in the universe (estimated by physicists to be roughly 10^{80}) is negligible compared to the unimaginable number of possible (re)combinations in Borges’ ‘Database of Babel’. Already the collection consisting of one single book, together with all of the copies of this book showing one to twelve misprints, is bigger than the number of atoms in the universe (Bloch 2008).

Not only is the number of books mathematical sublime, but also the contents of the books, as they contain ‘all that is able to be expressed, in every language’. The narrator gives us a fascinating insight in the contents of those books:

All – the detailed history of the future, the autobiographies of the archangels, the faithful catalog of the Library, thousands and thousands of false catalogs, the proof of the falsity of those catalogs, a proof of the falsity of the true catalog, the gnostic gospel of Basilides, the commentary upon the gospel, the commentary on the commentary on that gospel, the true story of your death, the translation of every book into every language, the interpolations of every book into all the books, the treatise Bede could have written (but did not) on the mythology of the Saxon people, the lost books of Tacitus. (Borges 1962: 115)

In the case of Borges’ *Library of Babel*, we can still comfort ourselves with the idea that this story is part of his *Collected Fictions*. After all, the Library of Babel is only a product of artistic imagination. However, in the domain of biotechnologies we confront databases that are even more astonishing, both in magnitude and in scope. If we take into account that the human genome alone consists of roughly three billion nucleotides, written in a four-letter language, we realize that the number of possible (re)combinations ($4^{3,000,000,000}$) of the human genome is even more sublime than the number of books in Borges’ Library.

Besides the magnitude of combinations, the database containing the human gene pool differs from many other databases in yet another respect. Although dazzling because of the unimaginable numbers of combinations, the information age version of the mathematical sublime is, to use Schiller’s distinction, still only *theoretical*. However, the impact of databases is not restricted to the world of computing. Databases often function as material metaphors. This happens when they evoke acts in the material world (Hayles 2002). Examples of this are databases implemented in industrial robots, enabling mass customization (e.g. ‘build to order’ cars). But this is also true for biotechnological databases used for genetic engineering. Here we enter the domain of the *practical* dimension of the technological sublime. By actively recombining the elements of the database in the real world, by genetic manipulation or synthetic biology – building organisms from scratch using ‘biobricks’, for example – we unleash awesome powers and, in so doing, transform the dynamic sublime in a fundamental way (cf. ETC Group 2007).

In our (post)modern world it is no longer the superior forces of nature that call forth the experience of the sublime, but rather, the superior forces of technology. With the transfer of power from divine nature to human technology, the ambiguous experience of the sublime also nests in the latter. In the era of converging technologies – information technology, biotechnology, nanotechnology, and the neurosciences – it is technology itself that gains an *ungeheuer* character in its battle with nature. Without doubt these technologies have increased our power over nature enormously. However, this does not mean that we have become gods in the sense that we have gained control over our own destiny. Rather, our relation with nature is changing:

Where technology and nature are traditionally seen as opposed to each other, they now appear to merge or even trade places. While old nature, in the sense of trees, plants, animals, atoms, or climate, is

increasingly controlled and governed by man – it is turned into a cultural category –, our technological environment becomes so complex and uncontrollable, that we start to relate to it as a nature of its own. (Van Mensvoort sd)

While technology is an expression of the grandeur of the human intellect, we also increasingly experience it as a force that controls and threatens us. Technologies such as atomic power stations and genetic modification, to mention just two paradigmatic examples, are Janus-faced: they reflect, at once, our hope for the benefits they may bring as well as our fear of their uncontrollable, destructive potentials.

At first sight it seems that in these cases technology completely controls and conquers nature (Heidegger 1962). However, in the fast growing domain of the biotechnologies (which will probably become as important in the twenty-first century as the physical sciences were in the twentieth century), we witness a remarkable revenge of nature *within* technology. After all, technologies like genetic modification and synthetic biology create entities that are no longer passive, manipulatable innate elements, but have, and will increasingly have, their ‘own agenda’.

Next nature

In fact, in this domain of ‘next nature’ we witness the vanishing of the very opposition of nature and technology. A striking example of this development is *GFP Bunny*, created by the Brazilian artist Eduard Kac in 2000 (see illustrations 1 and 2). Kac commissioned the ‘transgenic’ bunny from a French lab, where scientists injected green fluorescent protein (GFP) of a Pacific jellyfish into the egg of an Albino rabbit. This is how the artist describes his experiment:

My transgenic artwork ‘GFP Bunny’ comprises the creation of a green fluorescent rabbit, the public dialogue generated by the project, and the social integration of the rabbit. [...] ‘GFP Bunny’ was realized in 2000 and first presented publicly in Avignon, France. Transgenic art, I proposed elsewhere, is a new art form based on the use of genetic engineering to transfer natural or synthetic genes to an organism, to create unique living beings. This must be done with great care, with acknowledgment of the complex issues thus raised and, above all, with a commitment to respect, nurture, and love the life thus created. (Kac 2001)

In spite of Kac’s emphasis on ‘great care’, his experiment has led to heated debates about the tolerability of such works of art. However, besides ethical objections, Kac’s *GFP Bunny* raises the question whether this ‘work’ can be called a work of art at all. Perhaps it rather belongs to the domain of nature or to the domain of technology. But probably it belongs to all three domains at once: art, nature, *and* technology. With regard to ‘next nature’ we can no longer distinguish sharply between these three domains. Although in a different manner than envisioned by the historical avant-gardes, Kac’s *Alba fluo rabbit* seems to realize their dream to transform life itself into a work of art.

Conclusion

According to David Nye, this explains why enthusiasm for the technological sublime has transformed into fear in the course of the twentieth century. This is also why it is often said, in relation to aforementioned sublime technologies, that we ‘shouldn’t play God’. At the same time, twenty-first century man has been denied the choice to *not* be technological. The biotope in which we used to live has been transformed, in this (post)modern age, into a technotope. We have created



Eduardo Kac, *GPF Bunny*. Mixed media, 2000.

technological environments and structures beyond which we cannot survive. The idea that we could return to nature and natural religion is an unworlly illusion. In fact, because of its Janus-faced powers, 'living technology' itself has become the sublime god of our (post)modern age. Assessments regarding the fundamental transformation from the natural to the technological sublime may vary; however, no one can deny that technology is a no less inexhaustible god.

Notes

1. The term 'aesthetics' was introduced by Alexander Baumgarten in his two-volume (1750 and 1758) publication *Ästhetica* (Baumgarten 1961). The term, for Baumgarten, referred to both the science of sensory knowledge, in accordance with etymology of the Greek verb αἰσθάνομαι (to perceive), and the study of the fine arts. Especially since Kant's *Kritik der Urteilskraft* (1790) and the development of aesthetics as an independent philosophical discipline dealing with beauty and art, have become dominant.
2. <http://www.nextnature.net/about/>. NextNature.net is a project of the Next Nature Institute (supported by the Mondrian Foundation, Eindhoven University of Technology and Fonds BKvB). This Institute, in which designers, artists, philosophers, and scientists collaborate, aims at exploring and understanding our changing relation with nature 'by visualizing and researching the implications of the up-and-coming next nature on our everyday lives'. In the past five years I had the privilege to participate in several projects of the Institute, which inspired the present exploration of the technological sublime.
3. *Merriam Webster's Collegiate Dictionary* (2000) defines the noun 'sublime' as follows: '1: to cause to pass directly from the solid to the vapor state and condense back to solid form; 2 [French sublimer, from Latin sublimare] a (1) : to elevate or exalt especially in dignity or honor (2) : to render finer (as in purity or excellence) b : to convert (something inferior) into something of higher worth'. Used as an adjective it

refers to things that are '1 a : lofty, grand, or exalted in thought, expression, or manner b : of outstanding spiritual, intellectual, or moral worth c : tending to inspire awe usually because of elevated quality (as of beauty, nobility, or grandeur) or transcendent excellence; 2 a archaic: high in place b obsolete : lofty of mien : HAUGHTY c capitalized : SUPREME — used in a style of address d : COMPLETE, UTTER <sublime ignorance>. synonyms see SPLENDID'.

4. However, the doubt about the correctness of the translation does not seem to be justified. Just like the Latin *sublimis* the Greek ὑψος refers to 'high', 'summit', 'loftiness', 'dignity'.

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