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Cloud Animation

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Abstract

Clouds are animate forms, shifting and evanescent, mutable and always in movement. They have also long been a subject of imagery, especially painting, because paint, most notably watercolour, as John Constable knew, seeped into thick drawing papers much as a cloud seeped itself through the sky. The drama of clouds in the 20th century was seized by film and it is striking to note that many Hollywood Studio logos use clouds. Clouds from Constable to the Hollywood logos are Romantic clouds. They drift and float, produce ambience and mood, along with weather. But the cloud appears in the digital age too, in more ways than one. Clouds have been constituted digitally by commercial animation studios and used as main characters in cartoons; they are available in commercial applications, such as architecture and landscaping packages; they have been made and represented by art animators. This body of work, kitsch and dumb as some of it is, is treated in this article as emblematic of an age in which the digital cloud looms as a new substance. The cloud in the digital age is a source of form, like a 3D printer, a source of any imaginable form. As such it comes to be less a metaphor of something else and more a generator of a metaphor that is itself. Now we live alongside – and even inside - a huge cloud metaphor that is The Cloud. In what ways do the clouds in the sky speak across to the platform and matter that is called The Cloud? What is at work in the digitalising of clouds in animation, and the production of animation through the technologies of the Cloud? Are we witnessing the creation of a synthetic heaven into which all production has been relocated and the digital clouds make all the moves?

Keywords

Cloud, day-dreaming, dust, digital, metaphor, Romanticism

What was, is and will be a cloud?

The ways in which a cloud exists both in the air and in imagination have been translated into visual form in many different ways, in art and mediated culture. How a cloud is rendered, what it looks like, what it seems to convey, beyond its state of being a cloud, has often been mingled with associated meanings, symbolic connotations – for example, the cloud stands in

for emotional states; the cloud connects us with the divine; the cloud conveys us to Utopia or indicates a bad omen, a storm to come. There are concrete and material issues connected to these renderings. How a cloud is made in visual culture is a matter of how a cloud can be made in visual culture in technical terms: how does oil paint translate airy water into a painterly form; how does watercolour intermingle with the forming demands of cloud shapes; how do computers generate objects that have cloudlike qualities. In each of these instances a cloud is made, and it is one that differs from the others. In each, something of a cloud's presentation and capacities is translated into form, but what results is not just an image of a cloud. The results instead seems to extract something about the world over which actual clouds float, something about the technologies that interpose between humans and visualisation, something about how these are shaped and directed by a broader environment of social relations with nature and imaginative relations with heavens or skies and something about the material properties of the forms and means by which clouds are translated.

This essay conflates in a variety of ways the cloud and animation as form and practice. Both cloud and animation have a connection to movement and mutability. The cloud has appeared in animation, in a variety of ways, as the essay will explore, and as it explores these it tracks a movement within visual culture more generally, and animated culture more specifically, if initially at differing times, from the cloud as decorative element, as part of the backdrop that makes a setting plausible, to the cloud as Romantic element, annexed to human emotional states, to the cloud as the site of all production, the maker of form without human agency, a hellish endlessness of production without limit or rationale.

Cloud viewing

Clouds have long been stuff for representation, becoming perceptible in different ways through various types of visual culture, drawing, painting, photography, film. In reproducing the cloud, efforts have been made to capture it, or to capture something of it, for the cloud itself, the specific one, if there is one, in a specific sky, has always moved on, adopting another form. In Medieval times, in European visual culture, clouds were often part of painting's skies and their rounded, repetitive, emblematic shapes formed a backdrop to Christ's life and death. These clouds are at one and the same time no clouds and every cloud and they seem to survive for some time as dramatic elements of a painting remembered in the context of a studio. They are derived from memories of other painted clouds, or are conventional. But by the 17th century, Andrea Mantegna, Giovanni Battista Tiepolo and

others change the form of the clouds they paint, making them more substantial, puffier, bolstering them, just as the clouds bolster other things, such as Gods and horses. These painters render clouds as solid arrangements proficient at suspending beneath them, beneath the churchly domes they represent and decorate, or within themselves, scenes from Heaven and Earth. Other artists, such as Peter Paul Rubens, appear to observe clouds more closely, while also freighting them with the capacity to convey interior truths and emotional facets. Arguments reign as to the realism of the clouds of Golden Age 17th-century Dutch landscape painting – for, in the work of Jacob van Ruisdael, Adriaen Pietersz van der Venne or Roel Sandvoort, the skies favoured are those that are dramatic or fine (Ossing, 1991). Were there no gloomy days, or did the painters stay home in dull weather? Meteorologically realistic or heightened for art, these painted clouds develop a greater airiness and, over time, turn into the clouds of Romanticism, clouds which are composed in relation to a Romantic aesthetic of direct observation from nature. Romantic clouds are clouds that are the subject matter of painting. They are not a backdrop or a support for something else. They are the stuff of the painting. For the Romantics, the cloud was composed of a matter that was to be translated in a new way into painting. The matter of the cloud and the matter of art were to collapse into one. Paint, most notably ink or watercolour, as John Constable demonstrated so exemplarily, seeps in actuality into the thick drawing papers much as it seems a cloud seeps itself into the sky, intermingled with the atmosphere. The cloud is a cloud, just as it is a representation. It is a fuzzy diffusion of water droplets into the paper that is its atmosphere. Constable stood on the Heath at Hampstead immersed in air and its movements (Thornes, 1979/1999). He held there exposed to the elements and sketched. Clouds are notoriously hard to draw, not only because they change and move. If one wants to convincingly emulate their form, rather than produce a distinctly outlined cartoon cloud of the kind that cycles round behind the main action on a limited animation, they cannot be outlined, but only brushed and dabbed into being, tentatively, with a modulated pressure. The self's gestures adapt to produce the cloud of watery substance, coaxed into being as a reflection of a temporary moment. Something freeform, loose and subtle works its way into the fibres of the paper. The delicate materiality of the clouds seems to be repeated in its painted form. The animated nature of the cloud, its tentative existence, its watery plasticity, is emulated in the artist's media and mode.

As the 19th century progressed, early photography struggled above all, as photographers attempted to usurp landscape painting, with the fixing of clouds. Early photographic emulsions were not equally sensitive to all parts of the spectrum. A negative correctly

exposed for the landscape left the sky overexposed. Photographers tended to avoid the problem by painting out the sky on their negatives, giving a perfectly blank and even sky in the final print. Another approach was to make the final print by combining two different negatives – one exposed properly for the landscape, the second for the sky. Most photographers preferred the separate negatives technique. Henry Peach Robinson, the master of combination printing, felt that even if it were possible to photograph landscape and sky simultaneously, far more artistic results could be achieved by using separate negatives. In his influential book, *Pictorial Effect in Photography*, published in 1879, Robinson wrote:

However natural any sky that may happen to be in the heavens at the time the photograph is being taken, it only occasionally occurs that it is the best, or nearly the best for pictorial effect ... What the photographer has to do, then, is to select and use a probable sky to increase the beauty of his work; but it must be such a sky as would render it impossible ... for the carping critic ... to say it is not true (1892: 52).

Robinson allows the cloud to become the site of plausible fiction. He explicates the cloud, moving it towards something that becomes useful, usable for the image, lending drama to the photograph, animating it in a sense, because the cloud conveys mood, atmosphere, as much as it makes the end-result heightened.

Clouds and their uses

The clouds that scurry into the cinematic culture of Nazi Germany are blown in, according to the film critic Siegfried Kracauer, from the quintessentially Germanic mountain films, popular in the 1920s. Close attention to these cinematic clouds allowed for augury (Kracauer, 1947: 208). Mountain films are replete with images of clouds, of mist and fog, of vapour and blinding light bouncing off snowfields into camera lenses, and in this they draw on the resources of Romanticism. These puffs and flares obfuscate. The clouded vision they generate is meant to provoke emotional responses not rational thought. The cloud's suffusion of vision, the mists, glares, drop outs in the visual field are special effects for affect. Such clouded film strips were for Kracauer portents of the unenlightened gloominess to come. In the opening sequence of Leni Riefenstahl's *Triumph of the Will*, a propagandistic reportage on the 1934 Nazi Party rally in Nuremberg, shots of clouds at the start of the film are meant to establish a lofty tone and a reverential encounter with German nature. These clouds part to

reveal Hitler's Junker aeroplane. The saviour of Germany descends to earth from above. The clouds, in German, 'Wolken', form a canopy uniting the 'Volk', the German people. These same fascist clouds are seen from below in the closing episode of *Triumph of the Will*, a backdrop to Hitler and the marching SA men, who come to carry out their master's transcendent will. The brooding soul of the German people is projected by Nazism into the clouds. Riefenstahl mobilised the clouds as backdrop and dramatic arena in her film on the 1936 Olympics in Berlin. Olympia has countless shots from below with fine-bodied athletes silhouetted against a cloud-filled sky, like superheroic Gods leaping through the air. But Riefenstahl did not go as far in her pathetic fallacy as Walt Disney did in 1943. The opening sequence of Disney's anti-Nazi cartoon *Der Fuehrer's Face*, featuring Donald Duck, shows a brass band with musicians Hirohito, Goering, Goebbels and Mussolini goose-stomping through a little German town under clouds that have taken on the shape of swastikas. The sky too has been forcibly coordinated with the political regime. In this little detail the cartoon conceptualised something profound about the relentless reach of the totalitarian mode, in which even nature is made to conform to the master's ideology. Clouds, a landscape, nature are exposed as that which has been compelled to legitimate Nazi rule, which claims for itself an existence as natural development, as an anti-metropolitan phenomenon.

Shortly after this encounter between Nazi clouds and Disney clouds, cocky fascist fantasy clouds were countered by more clouds, actual ones, that had dangerous uses. The Romantic cloud of emotion and ideology develops into a cloud with purpose, not its own purposes, but those worked into it. The nuclear mushroom cloud seared its outlines onto consciousnesses – and worse onto some bodies, as it came bearing a radiation cloud that cannot be seen, but demands a certain kind of belief. Such invented clouds are deadly ones and they are not sites of day-dreaming reflection, but rather are made functional for ideology and for war. Clouds become actors on a world stage. Such clouds were given a kind of animate life: The atom bombs that were deployed in tests and those that were released on populations were habitually given names, like Big Boy or Fat Man, or names and dates, like new-borns are, such as George, May 8, 1951, Charlie, Oct. 30, 1951, and Mike, Oct. 31, 1952. These nuclear clouds typically had gigantic, rose-coloured, mushroomy heads and, together with their gangly bodies that hang below, they bore a resemblance to babies, or maybe alien-babies or some sort of new and different nature or organic lifeform.

The drama of clouds – that clouds would become actors perhaps - in the 20th century was apprehended by film. It is striking to note that many Hollywood Studio logos adopted clouds as part of their identifying image: Warner, Columbia, 20th Century Fox, Paramount, Warner Bros, Walt Disney and Dreamworks. These clouds of the Hollywood logos are the offspring of John Constable's and suggest a Romantic aspect, promising emotional adventures and intense, if vicarious, experiences. They are distanced from the functional clouds of death, be they the clouds of poison gas of the First World War or its deadly successors (Sloterdijk, 2009: 27-9). These logo clouds are clouds for dreaming, of fantasy and fantastic fictions. They are clouds of feeling, of the promise of intense emotions, of melancholy and of laughter. They are universal clouds that are supposed to appeal to all, for they float in the sky above everyone's head, above every audience member, who in seeing this film, this logo, inhabits a world that they might wish to be the world in which Hollywood clouds drift by and dreams do come true.

Digital clouds

Clouds in the sky are animate forms, shifting, evanescent and transforming. Such clouds, those in the sky, heaps of snowy softness, allow occasions for day-dreaming and fantasy, as popular idiom attests: head in the clouds; air castles; cloud-cuckoo land. These clouds are to be seen and also not seen, as the wandering mind, follows the wandering cloud, and then turns inwards, musing on vague or distracted thoughts, memories, questions or more dreamy matters. Clouds in the sky shape and reshape, and in doing this they appear to adopt the principles of animation, if animation is defined as the assumption of form, the possession, at least apparently, of the ability to move, and the capacity to change. More specifically, the cloud exhibits the inescapability of change, for a cloud may never remain static. Clouds, it is said, take on the form of things, just as modelling materials and cut outs take on the forms of things in Claymation and Stop Motion processes. Clouds move, blown by another agency, the wind, just as animation's movement is delivered by an external source or sources: cel sequences generated by hand, or computer, multiple images flicked by a thumb, motion paths, frame rates, sequential photography, robotics, secret wires. In addition, as clouds are blown, the cloud-forming particles shift position, making out of the cloud constantly recomposed, gradually transforming shapes, which could be conceived at each moment as frames in an animation, each minutely different from the other. The changing nature of clouds, the ways in which they adopt, if only fleetingly, forms of things, of things that they are not and constantly, endows the cloud with the capacity to successively animate other

things. Such things that the cloud appears to be and to become are often animate things: animals, angels or faces, perhaps even the face of Jesus.¹ Animation foregrounds narratively the capacity to change.² In animation's worlds, a cow can become a musical box, while it is also humanoid in some regard. A black patch on a rock can become a tunnel and the physics of this world can be transcended. A boy finds a watch and can transform into an alien and magical girls turn into ponies. In anime the transformation is fundamental to the animation, as figures move vibrantly between human and non-human states.

The cloud is animated because it moves, changes form, appears to propel itself and yet is propelled by external forces. Clouds are seemingly peculiarly adept at forming things, or rather, forming the shapes of things, that is to say, of acting like metaphors. Clouds are nebulous and they form the shape of things nebulously, for a while, before moving on. Clouds have been seen as signs of other things, auspicious or ominous. There are so many types of cloud - painterly clouds, emotional clouds, such as Cloud 9, heavenly clouds that convey signs and omens, grey clouds and silver linings, impossible clouds, nebulae in cosmic space and also in our eyes, dust clouds after explosions, thought clouds, day-dreaming clouds, clouds at the heart of meaning and obfuscating theory, the mushroom cloud of the atomic bomb, 'plague clouds', 'cholera clouds', magic mists, mushroom clouds, cloud buildings, such as *The Blur*, a building made of a cloud, and there is Cloud Cuckoo Land, first conceived in Ancient Greek drama, in Aristophanes' *The Birds*, first performed in 414 BC, and which now exists in a blocky version in *The Lego Movie* and a play set version for self-building:

Cloud Cuckoo Land: A land up in the clouds where there are no rules, no limits, no bushy mustaches and no bedtimes. Reached by traveling up a rainbow and home to the sweet and plucky Princess Unikitty, Cuckoo Land is built from every kind of piece using every type of LEGO imagination.³

But with all of these forms of cloud, the cloud, every cloud, painted clouds, cinematic clouds, clouds of fantasy and clouds of particles, there is no fixed form or essence. The cloud, these clouds are made of an assemblage of materials, assorted ideas, beliefs and practices. The cloud is itself and something else. It is the cloud of all history and of none at all. The cloud is the shape of something really in the world, as much as it is the sign of an effervescent affective actuality.

In the digital age of visual culture, the cloud continues to take on many forms, but the cloud of the digital age appears to have emphasized, alongside the fantastical, something that links to the useful, the functional, the productive, and thereby undercuts the Romantic cloud, while drawing on its emotional aptitude. Clouds have been constituted digitally in various modes of CGI animation. Clouds are available in commercial applications, such as architecture and landscaping packages. Here they are set to work making a location plausible and desirable. Clouds have also been constructed digitally by art animators. For the art collective FriendsWithYou (Samuel Borkson and Arturo Sandoval III), clouds perform something very special. FriendsWithYou's version of a cloud, with inflated cumulus curves and basic facial features, is present in much of the collective's art works, as in *Cloud City*, an installation from 2005 at the Warehouse of the Museum Of Contemporary Art, North Miami, during the annual Art Basel in Miami. *Cloud City* was a playground of inflatable and pillowed geometric shapes: 'an adventurous dream world playground designed to reinvigorate audiences with childlike energy and optimism'.⁴ A cloud with the outlines of a smiley face appeared in a Taipei installation, *Field of Dreams*, as well as in a light installation, entitled *Into the Clouds*, commissioned for the studio by Fox's adult animation programming Animation Domination High-Def (ADHD). The cloud for FWY represents, apparently, all that is optimistic and spiritual. As FWY put it:

The Cloud is a symbol with the power to transcend the viewer to a relaxed and joyous state, revealing that everything in our world has a soul - a spiritual essence. This animist perspective reflects in FWY's work as a sweet visual soundscape, casting a positive message of happiness and connectivity.⁵

Precisely through the emotional nexus that has been attributed to the cloud, the cloud uses emotion in an industrialized, standardized form to conjure up and manage emotional states. Just as the little clouds made by FWY, like emoticons or emojis, break down emotional states into basic, typographic forms, the smile, the laugh and other signs of emotional conditions on the human face are becoming operative in new ways. Through history, the smile has been a gesture produced for the machine, for photography's dead eye. But that eye is no longer dead, now that cameras possess 'smile detection' technology. Computing systems now develop, through machine-learning, algorithms that can detect laughs, smiles, as well as all the negative emotions, and adjust or adapt their functioning accordingly.⁶ The many projects

happening under this guise turn the gaze of the human into an active element, providing data. This is a diabolical twist in digital bio-political management, with obvious commercial and political uses. The cloud of FWY that should make us happy is another technique of emotion management to partner the optimizations attempted through contemporary digital technologies that track leisure, consumption and work. The cloud, in this emoji form, interposes between the viewer and the emotions and exerts an effect.

In 2012, FWY made an animation titled *Cloudy*, which is another iteration of their ultra-happy pneumatic aesthetic. In this animation the clouds have faces and characters, in the way that emoticons have faces and characters. These are basic, recognizable and graphic. The animated clouds are 3D, which makes them continuous with brass maquettes or plushes that can be bought directly from FWY's website. In the animation, the clouds with character are engaged initially in floating around and singing.⁷ Out of heaps of cloud that look like snow, equally pneumatic and smiley raindrops make baby clouds, squeezing them out through a pipe. After this, the animation gestures at the early world of Walt Disney's Silly Symphonies, where characters' actions are entwined with making music. The clouds become a bouncing trampoline-like surface for the raindrops as they play. They end up as platforms from which raindrops fall onto earth, as if from a production line, joyfully. FWY's commentary on the animation, recycles the same words and thoughts as elsewhere in their promotional materials, when they discuss clouds, divulges, in a series of commonplaces:

The purpose of the piece is to transcend the viewer to a peaceful and joyous state. Clouds singing and performing their duties in a joyful manner show us that everything in our world has a role and a purpose.⁸

This body of work, kitsch and dumb as it is, is emblematic of an age in which the cloud, once eternally formless form, looms as a new substance, in a new guise, if that is one that is hard to grasp and hard to model convincingly. This digital cloud is an emotional agent, but it is more than a producer and manager of emotions. Notable is that these happy clouds, like the raindrops that bring them into being, are productive. These clouds perform their duties, so that we, the viewers, might learn a lesson about purpose. The clouds of *Cloudy* are captured inside a kind of factory that is a huge cloud, which resembles a submarine or something like the tree-man in Hieronymus Bosch's *The Garden of Earthly Delights*. The clouds are being made by the repetitive labour of the raindrops. They go on to perform music or to provide

platforms for raindrops. The clouds are understood from the perspective of production and purpose.

The clouds that appear in widely-available animated GIFs of clouds are likewise – and aesthetically very similarly - always doing things: raining, making lightning, puffing, forming shapes of other things.⁹ The cloud becomes less an externalisation of emotions and more something that itself possesses emotions, as it functions in ways more or less useful for humans. The cloud is sad. The cloud is furious. The cloud is happy. A number of CG films illustrate this capacity of the cloud to model states of emotion. A CGI 3D animated short film *Cloudy Day*, produced by Ecole Supérieure des Métiers Artistiques in 2012, features a cloud that makes or brings water. The people of a land are plagued by drought and one of their number builds a machine to capture clouds in order to squeeze water from them. The cloud is a thing to be captured, in order to be made useful for humans, who are in need of its water supply. After too excessive a haul, the clouds become livid – stormlike – and flood the land. They give an excess of what was stolen from them, in a devastating act of destruction. Production and purpose is pushed into surplus.

In 2014, Boys and Girls Dublin advertising agency made a Christmas advert for Three Mobile in Ireland. Titled *The Perfect Surprise*, it is a live-action piece about a father finding a present for his daughter. The gift is a snow cloud, seemingly caught from some mountain range elsewhere. The cloud, once released from its wrapping paper, appears on the screen as an animated presence, hovering in the sitting room. Two years later the story is continued in a short 3D animation titled *The Girl and the Cloud*, made by Studio AKA and Red Knuckles Studios. The girl spends some time with her cloud, playing. It is like an animal, bounding by her side, and it is also like another child, pushing her on the swing, standing in goal. The cloud becomes sad in time, turning grey and dull. The four minute animation ends with the cloud being released in the mountains to join other clouds. This cloud that is a friend has needs too. And it is not that our emotions are projected into the clouds, rather the cloud itself is emotional as much as it is enlivened. It plays. It becomes miserable. It has to set off on new adventures. The cloud becomes a personality, and animate existence is extended to it. The digital cloud must have personality and it poses questions about autonomy and service, about being for us and being for its self.

Clouds have been deployed by the large animation studios. Pixar, who made *Partly Cloudy* in 2009, and Sony's two *Cloudy with a Chance of Meatballs* films (2009/2013), both foreground clouds and they help to address the question: What is a digital cloud? In *Partly Cloudy*, the productivity of the cloud is reinforced – for the clouds in this animation make babies, indeed they are capable of making any form that is needed. The clouds in the *Cloudy with a Chance of Meatballs* film series are – in conjunction with machinery – the place from which first foodstuffs and then hybrid food-animals or foodimals appear. The digital clouds in these examples are preoccupied with making forms. Clouds in the sky are peculiarly adept at seeming to form other things, or rather, suggesting things by their momentary shapes and it was this that was emphasized in the Romantic rendition of the cloud and any other clouds that relate to dreaminess and otherworldliness. The cloud in the digital age is likewise a source of form, but rather less as momentary impression and more in the mode of a 3D printer, a source of any imaginable form. The cloud is occupied, busy in production. As such it comes to be less a metaphor for something else – the cloud as x, y or z - and more a generator of form itself. The cloud is a kind of factory, if one from which human labour appears absent.

Clouds of dust and a dark romanticism

The Cloud was the name given to a centrepiece building designed to be erected in in Seoul, South Korea, in 2015. The building was to be part of the vast Yongsam Dreamhub project, an extension of the city's business district, overseen by Daniel Libeskind. The Cloud building was made of two high rise towers 'connected in the centre by a pixelated cloud of additional program offering amenities'.¹⁰ The cluster of blocks was to swell out from the upper middle floors of the 260 and 300 metre-high towers, in order to accommodate an atrium, restaurants, gym facilities, a conference centre and office-hotels. When it was first revealed, The Cloud garnered controversy. Some claimed that its showpiece balling of room units produced an outline similar to that which had been captured photographically of the cloud of dust that appeared between the collapsing twin towers of the World Trade Center in New York following the 9/11 terrorist attacks.¹¹ Architectural firm MVRDV apologized, stating that it was not their intention to upset the public and that the inspiration for the design had nothing to do with 9/11: it came rather from a 'real cloud'. But the Cloud building and its ball of built cloud appeared little like a real cloud. It seemed more akin to a cloud seen through computers or screens. It was in any case a cloud made on screen, its rooms clinging squarely together like pixels. The project for Dreamhub collapsed in 2013, as investors pulled out, nervous about the prospects of Korean real estate (Cho and Križnik, 2017: 51). Its cloud had evoked

the utopian dreamy clouds that are descendants of Romanticism, but it translated them into a modern idiom of computing, concretion and functionality.

A few years prior to this, an artist produced a cloud that might link to those clouds of dust that arose from the World Trade Center, clouds of dust that were the inaugurating clouds of an epoch of wars in the oil-rich Middle East. Over the last decade, John Gerrard has produced a series of what he terms 'animated scenes'. These animated scenes are a way of addressing landscape and landscape painting in the contemporary age. Two of the first of such scenes represented clouds. *Dust Storm (Dalhart, Texas)* and *Dust Storm (Manter, Kansas)* from 2007 combined an animated archival photograph of a cloud in the American dust bowl of the 1930s with photographs and films of an area of landscape in Texas and Kansas and satellite and topographical data. What appears to be a film or a video is a simulated world developed out of real-time computer graphics, as used by the military and the gaming industry. The cloud of brown dust, static on the photograph, was animated by Gerrard into a whirling storm cloud using digital tools. The storm cloud's patterns of swirl are, reportedly, based on the churns of dust, or desert storms, caught on video by soldiers serving in Iraq. A link is made between two environmental disasters. The massive oil fields in the Southern states, and the use of oil-fuelled mechanized agriculture, produce an environmental disaster in the 1930s. The presence of oil in late twentieth century military adventures produces another one. The dust clouds eddy amidst their composite Northern Texas and Kansas scenery under the diurnal conditions of real time Dalhart and Manter, emerging into view in a 360 degree pan that takes eight minutes, before the camera passes back to the blank horizon, again and again, following the day, the night, the months, the years as they cycle through a real geography. Both works are, in part, simulations of some moments which took place on Sunday, 14 April 1935, when the dust clouds were at their worst, 1500 miles wide and half a mile high. On that bleak day, under the thickest dust cloud from 100 million acres of land, cattle were choked and blinded. People were driven out, suffering dust pneumonia and suffocation. Areas were devastated. These moments are made by the animated scene into a day, that Black Sunday. The world is not as it should be. The cloud is on the ground. The cloud has been brought down to Earth, and is of earth, of topsoil loosened and made airy dry by the ripping out of native grasses for the massive farming of wheat. This dust cloud is a threatening cloud that looms in a sublimely devastating way. In its manufactured nature, though, it resembles a once new cloud, now quite old, a cloud that comes about historically, as defined in John Ruskin's lectures on the 'Storm Cloud of the Nineteenth Century', written in 1884 (1964).

Ruskin, in *Modern Painters*, written in 1843-60, suggests that if a name were needed to characterize modern (by which he means nineteenth-century) landscape painting, it would be, for better or worse, 'the service of clouds' (1964: 84). The modern artist is a cloud worshipper. The cloud is the resource of artists, earthly and divine, evanescent, beautiful. Ruskin submitted cloud cover to perspectival grids, reigning in the unreignable, for the purposes of capturing it in drawing, for capturing the 'truth of clouds' (1964: 84), as Constable and Turner had done before him, through looking.¹² But, in 1884, Ruskin became obsessed by what he called variously the black cloud, storm cloud, plague cloud, black wind, plague wind, evil wind or black fog. This was a new weather phenomenon, a historical cast into nature's eternity. Ruskin delivered a lecture on this dark ugly cloud titled 'The Storm-Cloud of the Nineteenth Century' (1964: 213). This storm cloud was a new cloud, one that 'never was seen but by now living, or lately living eyes'. Until these times, the cloud was, even when soaked with rain and storm, a benevolent one.

The beneficent rain-cloud was indeed often extremely dull and grey for days together, but gracious nevertheless, felt to be doing good, and often to be delightful after drought; capable also of the most exquisite colouring, under certain conditions; and continually traversed in clearing by the rainbow:—and, secondly, the storm-cloud, always majestic, often dazzlingly beautiful, and felt also to be beneficent in its own way, affecting the mass of the air with vital agitation, and purging it from the impurity of all morbid elements (1964: 446-7).

The cloud that came into being, according to Ruskin, after 1871 was different and he recorded it precisely in his diary, just as he had recorded decades of skies and sunsets.

This wind is the plague-wind of the eighth decade of years in the nineteenth century; a period which will assuredly be recognized in future meteorological history as one of phenomena hitherto unrecorded in the courses of nature, and characterized preeminently by the almost ceaseless action of this calamitous wind (1964: 448).

This cloud, as Ruskin puts it, is 'a dry black veil which no ray of sunshine can pierce; partly diffused in mist, feeble mist, enough to make distant objects unintelligible, yet without any

substance, or wreathing, or colour of its own' (1964: 447) As such it is not nature's cloud. It is rather the one of dense manufacturing mist. This cloud stems from a physical gloom produced by industrial capitalism, or what Ruskin calls 'the Manchester devil's darkness' (1964: 451), and it generates a 'moral gloom' (1964: 453). This cloud is a disconsolate one, invented by humans. It is a sign of human meddling and human idiocy. It is made of pollution, but it is also, Ruskin notes, made of dead men's souls. The storm-cloud is a material one of particulates, but it is also, in Ruskin's mind, a sign of decadence and immorality. Gerrard's cloud, in as much as it is made of dirt and greed and war, is also a malign and moral cloud. His dust cloud partakes of a dark Romanticism. The Romantic version of the cloud returns within the digital, but by its dark side, its negative face, in which malignity of human action and the antagonism with nature threatens, obscures, clouds the light of Enlightenment.

This dust cloud that Gerrard captures and reproduces that stems from an amalgam of dust and history from the Southern States and the Middle East evokes the Romantic cloud of foreboding. It is a symbolic cloud, which speaks to anxieties and omens of bad things to come. But this dust cloud is also enmeshed in digital worlds. It is comprised of an agitation composed digitally. It growls in a landscape that is digitally composited. It is annexed to digital systems that produce its night and day and Summer and Winter. As such, it becomes not only a symbolic cloud, an emotional cloud. It is also an operative cloud. It is a cloud of functions. This is the cloud of the digital age.

After making this artwork, John Gerrard wanted to see another cloud, or rather its infrastructure. He wanted to see, and represent, a data centre that is the home of the Cloud, just as Constable once saw and represented the clouds. He had to hire a helicopter to take his images, 2500 images, from the sky – and these were images designed to expel the cloudlike nature of the physical infrastructure of the cloud, or what Gerrard calls: 'the idea that the internet was "an ephemeral, quasi-mystical thing" fostered by terms such as the "cloud"' (Pickford, 2015). His resulting work *Farm (Pryor Creek, Oklahoma)* (2015) is a circumnavigation of a CGI animated reconstruction of the building, as seen from a virtual camera orbiting the facility. The farm is backed by a sky and suffused in a light which changes just as it does according to the time of day in Oklahoma. The rows of back-up diesel generators and cooling towers for the servers inside the building make it appear more similar to a chemical factory, with. It is unlike Google's own representations of its data centres,

which always emphasize a dramatic cloud filled sky above the slick and shiny buildings. The dramatic sky serves to make the industrial scene sublime. It serves to distract from the operational architecture. In a sense it is part of the work of making the data centre invisible. The cloud is used as a distraction, in the way it is used as a distraction in Google Earth, when the weather layer is turned on. The option exists there to switch it off, to make a cloudless and fully searchable world. Now we live alongside this huge cloud metaphor that is called The Cloud.

The cloud and the pixel

In 1896, the first International Cloud Atlas was published. It was not an effort to map the shifting impossibilities that are clouds, but rather a set of labelled pictures of clouds for purposes of identification and classification. In the first edition this was a mix of colour photography and paintings and these were designed to standardize vocabulary of cloud description and to train meteorologists in weather forecasting. The International Cloud Atlas emerged from the efforts of the International Meteorological Congress, which began the development of an international system of observatories, equipment and standards to collect and share meteorological data. A new international cloud atlas project currently underway now maps a different cloud, the computerised one.¹³

The New Cloud Atlas is a global effort to map each data place that makes up the cloud in an open and accountable way. We have set out to find and map each warehouse data centre, each internet exchange, each connecting cable and switch. Anything of any physical significance in the operation of the cloud should be observed in some way, and recorded for everyone to see and use.¹⁴

This new mapping attempts to make visible the cloud of cloud computing that is invisible or seems other to itself in the imaginations of those who think about it. The cloud of cloud computing was chosen to be an icon in network diagrams, the New Cloud Atlas project claims, because a sign was needed to represent something that is in the middle between the end to end points of data flow and which is too complex to draw. The cloud is a kind of nothingness through which information passes. It has even within the short history of digital culture become something else too over time, under the guardianship of corporatised information infrastructure, but its complexity is not shed, nor its capacity to shape-shift:

The use of the cloud has shifted in digital systems. The idea that ‘this is too complicated to think about’ has been moved front and centre and converted into a business model, shedding its innocence along the way. Through a sleight of hand, the cloud sometimes appears as a platform, and sometimes a material.¹⁵

All around us filaments thinner than a human hair send data pulsing through themselves in ultra-short bursts of light, conveying all the transactions of the Internet. The cloud is made of a network of data centres, the switching points through which data passes, of which a very small number are superconnections. A data centre is a sturdy well-protected building that houses servers, storage devices, cables and a connection to the Internet. There is also equipment for supplying vast amounts of power and cooling things down or extinguishing fires. Though they are places of passage and storage, they are known as ‘farms’, as if they grew and tended the bits of data that they shelter. Vast amounts of data move in small packets swiftly between these centres. The pathways are irrational, wandering even: the source and destination of a message might be in one country, but it may pass many times between data centres on different continents. The data centre sites are anonymous sites, out of the way for the most part and not designed to be seen. They are, unlike clouds, largely invisible. The cloud of computing is an indiscernible but pervasive presence. It is managed by ever fewer companies. It is a new, if concentrated, industry from which no part of the world is sheltered. The once nebulous cloud is now nebulous differently. It becomes a cloud into which our traces, our data, our hopes even, are alienated. It becomes a tool in as much as it becomes a mechanism of surveillance and tracking for commerce. It is a cloud with purpose, or purposiveness.

The cloud of cloud computing has implications for animation, which is now peculiarly susceptible to the rapid technological changes in computing. Systems update or become too slow to be used again, in a competitive environment, which is always changing, always adapting to new technological capacities. *Cloudy with a Chance of Meatballs 2*, for example, was unable to use easily all the accumulated dead labour of the first film, such as the design work for characters, because, the models were frozen in software from 2008, which would not allow the character files to get back online under contemporary operating systems. As the visual effects supervisor Pete Travers notes: ‘We basically had to rebuild a machine from the past, isolate the same operating system to get the character files back online, then transfer what we could into our new system’ (Miller-Zarneke, 2013: 17). The Land of Milk and

Honey has to be reimagined in the next generation CGI. Sundar Pichai, the chief executive officer of Google Inc, has spoken of the internet Cloud as an inflection point in the history of computing and he cited as an example the procedures of an animation studio in Mumbai, who at that time were making a film using Google Cloud Services.¹⁶ Cloud computing has indeed transformed the animation industry. CGI animation requires vast quantities of computational resources. Animation studios invested money in server farms and workstations, electricity, hardware and maintenance workers, in order to be able to render their animated projects. The push towards photorealistic textures and movements, facial expressions, buoyant strands of hair, means that a single frame of a CGI animation can take more than three hours to render. It took Pixar two years to render the 114,000 frames of the 77 minute film *Toy Story*, using its render farm of the time which was comprised of a few hundred processors (Baharon, M., Shi Q, Llewellyn-Jones D and Merabti M, 2013). In 2013, it took 29 hours to render a single frame of *Monsters University* and more than 100 million CPU hours to render the film in its final form, despite the many thousands of processors in use.¹⁷ By 2015, Pixar had 23,000 processors at its disposal (Bishop, 2015). Cloud service providers change this processing through large fixed ‘farms’ by providing rendering power on a rental or pay-as-you-go basis. Infrastructure is cast aside, lowering operational costs. The cloud is distributed, pervasive and everywhere, which also means that it is effectively nowhere or in unseen spaces that are temporarily hired and occupied.

David Theobald’s *The Cloud: All of Our Agents Are Busy* (2013) is an eventless CGI animation of the twinkling lights on something that looks like a series of servers. Indistinctly there are burbled automated or pre-scripted phrases from call centre recordings. All that happens is the oscillation of green lights, the static glow of a red light and an intermittent blue and red flicker that seems like flame in the innards of the machine. This five-and-a-half minutes of animation runs in a loop. It is designed for a 32-inch flat screen or computer monitor. It is described by the artist as a representation of ‘digital purgatory’. It is intended as an exposure of one small part of the Cloud for what it is, a power-hungry physical space whose expanding productivity involves the capture of our memories in spaces that are obscure.

‘The Cloud’ is fast becoming both the archive for our memories through private online drives and public archives of content such as Instagram, Flickr and YouTube. The marketing of such services intentionally evokes the idea of an ethereal

space. This means that, in our minds, ‘the Cloud’ has become massively abstracted from its physical reality - giant data centres consisting of thousands of servers in huge air conditioned hangers in some anonymous location. This work is a digital representation of one small piece of that hidden infrastructure.¹⁸

The animation renders with all its capacities of illusion, as made possible by Blender and other software and hardware, an experience of computing, or of cloud computing, with its impenetrable procedures, its lack of legibility, its sealed-in nature, where purgatory is not a hellfire but just an endless waiting in confusion and non-knowledge, in the context which we have rendered utter dependent on the correct and continual functioning of these blinks and glimmers.

The computer-generated image translates its objects into some sort of heightened state. They are more present in their space, it seems, because they have been so deliberately placed there, each shiver of a hair strand, each twist of a buttonhole or crack on a surface has been built up and then reinforced in thousands of hours of processing, much of which is now taking place in the synthetic heaven which is God Knows Where into which all production is to be relocated. These animated objects are things made of nothing, or made of electricity, silicon, lead, mercury, arsenic, cadmium, beryllium, glass, plastic and so many other materials.

Digital animation is used in gaming and in augmented reality experiences. New formats emerge as the technological capacities develop and forms merge. One such is the narrative VR short, an early example of which is *Defrost*, directed by Randal Kleiser, which consists of 11 five-minute episodes shot in stereoscopic 360 with the Nokia OZO camera and supported by 3ality Technica. The story is that of Joan who has been in cryogenic suspension for 30 years and is now awake in a hospital, being reacquainted with her life and reintroduced to her family. Joan’s perspective is the perspective of the viewer. We are Joan. But we are also the camera. The 360 VR camera is in the position of the viewer’s head. Viewers look down at a body which is their own. This harnesses the digital camera to the viewing eye. In so doing, it latches down one of the capacities of what is also a virtual camera within computer-generated animation, This virtual camera creates a three-dimensional space that can be traversed in any way, whether by the director or by the gaming viewer. This is mode of presentation that equalises the cinematic space and makes any point a point that can be looked at or looked back from. In this way, it becomes a stimulus to ideas of alien phenomenology, anti-

anthropomorphic claims and the idea that a cloud might be a thing that thinks and acts and sees, like us.

And we are like clouds, or are made like clouds in the digital age. We, identical with the camera eye, are invited to immerse ourselves in the animated virtual space of the game or the film, and to move slickly through it in any and all directions, like a cloud wandering, drifting (see Elsaesser, 2013). We can even move through walls and mountains sometimes, dispersing our body like molecules of cloud water or like a gravel of pixels. The perspective is always ready again to lunge and be lunged over environments, trailing, travelling and itinerant. The cloud gives this to us. But what the digital capacity donates to the cloud, to that thing in the world and in our imagination that goes by the name of cloud, is the ability to at least seem as if it is the productive force, the seeing and hearing force, the force that generates all form, is the custodian of all meaning, the maker, sustainer and arbiter of things, all communication and lifeforms. The cloud is us, because it produces us in its image and it is the source of all production, meaning, knowledge and judgment. The digital cloud, in its variety of guises, is a busy, twinkling, breathing digital system that is waiting to replace us. The information in the Cloud does think, act and see like us. It also day-dreams like us, when we look at the clouds, or so Google researchers would have us think as they explore ‘Inceptionism’ in their work with Artificial Neural Networks and image recognition and generation. Inceptionism is a process of inventive dreaming involving the use of what Google researchers call higher level neuron layers, ones which identify specific elements of the image, not just shapes and corners, to build on that they detect in an image. In one experiment an image of clouds was ‘fed’ to a layer that had been trained to detect animals in photos.

We ask the network: “Whatever you see there, I want more of it!” This creates a feedback loop: if a cloud looks a little bit like a bird, the network will make it look more like a bird. This in turn will make the network recognize the bird even more strongly on the next pass and so forth, until a highly detailed bird appears, seemingly out of nowhere.

The results are intriguing—even a relatively simple neural network can be used to over-interpret an image, just like as children we enjoyed watching clouds and interpreting the random shapes. This network was trained mostly on images of animals, so naturally it tends to interpret shapes as animals. But because the data

is stored at such a high abstraction, the results are an interesting remix of these learned features.¹⁹

Out of the clouds the artificial neural network dreamt up an admiral-dog, a pig-snail, a camel-bird and a dog-fish. These hybrid figures dreamt up in the cloud might one day be starring in entirely machine-made animations and then the cloud – or its representation - has reached yet new stage of being productive and functional.

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² For one exemplary modern version of this, see the 2012 showreel of the Animation Sequence project which invited animators to begin with a 250 pixel black square in the centre of the screen and produce out of it a story, returning by the tenth second to a black square in the centre of the screen. <http://animationsequence.com/> (Accessed 17 July 2017).

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⁶ Many research papers attest to this technology. One recent example, Zhenzhen Luo, Leyuan Lin, Jiugying Chen, Yuanyuan Liu, Zhiming Su (2016), 'Spontaneous Smile Recognition for Interest Detection', *Pattern Recognition: 7th Chinese Conference*, Tieniu Tan, Xuelong Li, Xilin Chen, Jie Zhou, Jian Yang, Hong Cheng (eds.) *CCPR*, Chengdu, Part 1, pp. 119-130.

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¹⁰ Available at <https://www.mvrdiv.nl/en/news/yongsan> (Accessed 17 July 2017).

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¹² See, for example, John Ruskin's diagram, 'Cloud Perspective: Curvilinear', in Ruskin, (1866) Vol. V, Plate LXV.

¹³ The New International Cloud Atlas Project is led by Ben Dalton. Tim Waters, Amber Frid-Jiminez and Joe Dahmen. Available at <http://newcloudatlas.org/#3/39.80/-30.60> (Accessed 17 July 2017).

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