

- During this talk we will be looking at 250 years of scientific development through the eyes of the artist.
- For further information I recommend the book *The Art of Innovation* by Ian Blatchford and Tilly Blyth.
- So let's start at the beginning ...

NOTES

- Ian Blatchford, Tilly Blyth, *The Art of Innovation* (Transworld, 2019). The book was used as the primary reference source. It is divided into three sections chronologically. Within these sections there are chapters on a wide variety of topics and I have one slide on each chapter.
- **Section 1: The Age of Romance**
 - The Scientific Sublime: Wright of Derby, a philosopher giving that lecture on the orrery in which the lump is put in place of the Sun.
 - Masters of Spectacle: Smelting in Shropshire. *Coalbrookdale by Night* to Loutherbourog

- Satirising Science. Gill Ray and laughing gas
 - Observing the Air. John Constables clouds
 - Tracking Progress. Turner in the age of steam, *Rain, Steam and Speed*
 - Plants on Paper: The Art of Botany, Joseph Lister, Anna Atkins, William Henry Fox Talbot
- **Section 2: The Age of Enthusiasm 1850 to 1940**
 - Reaching for the Moon: the Truth about Photography
 - Dying to Display: Variety and Vibrancy. William Henry Perkins and mauve
 - Capturing Time: Vision versus Realism. Oscar Gustaf Rylander, Muybridge
 - Celebrating Speed: Mobility and Maternity. The bicycle, Umberto Boccioni
 - Rejection of Rationality: Art as Protest. Otto Dix
 - Humans in the Industrial Machine: Smokestacks in Salford. LS Lowry and *Manufacturing Town*
 - Form of Knowledge: The Mathematical Model as Muse. Barbara Hepworth, Henry Moore
- **Section 3: The Age of Ambivalence 1914 to the Present**
 - Supersonic the Art of the Possible
 - Patterns from Atoms: Designing the Future
 - Wonder materials transforming every day life
 - Polaroid perceptions capturing an instant. David Hockney, Edwin Land
 - Protecting the Earth: Political Pessimism on screen
 - Patterns of thought: AI and Algorithms. Andreas Gursky Amazon

- Imagining Matter at the Edge of the Earth
- I also watched the TV programme: **Victorian Science of the 1890s**
 - Tesla
 - Philip Webb – first electric house
 - Electric chair in New York and electric chair conjuring trick in UK
 - X-rays, fear of seeing under clothes (sold x-ray proof underwear) or seeing the soul
 - Bicycle – did more for women's freedom than anything else. Bitterly opposed by men, women pelted with sticks and stones
 - H.G. Wells The Secret Bacilli – fear of studying bacteria. An anarchist steals a deadly cholera bacilli.
 - Percy Pilcher first flyer 1897. Emma or Ella Pilcher. Built first powered triplane but engine broke and he died demonstrating his Hawk 'hang glider' when wings broke and he fell from forty feet. It has since been built and it is thought it would have worked and he would have been the first powered flight in 1899.
- 1830s photography
- 1840s First Christmas card (invention of Morse, tarmac roads, first glider flown by a pilot)
- 1850s sewing machine, petrol, ice cream, first public flushing toilet, steel, safety matches, pasteurizing, discovery of oil



Joseph Wright of Derby (1734–1797), *A Philosopher Giving that Lecture on the Orrery, in which a Lamp is put in place of the Sun or The Orrery*, c.1766, 147.2 × 203.2 cm, Derby Museum

Robert Stewart (engraver) after John Townsend, *James Ferguson* (1710–1776), 1776, mezzotint

Godfrey Kneller (1646–1723), *Isaac Newton*, 1689, Isaac Newton Institute

- **We start just over 250 years ago with Joseph Wright of Derby. This is *A Philosopher Giving that Lecture on the Orrery, in which a Lamp is put in place of the Sun* and it was painted in 1766. Four years earlier, Wright's neighbour, a clockmaker (John Whitehurst), was selling tickets for a lecture given by James Ferguson (1710–1776), a Scottish scientist, and the most famous travelling lecturer of the period. Such science lectures had become very popular during the Enlightenment and were attended by a mixed audience. Ferguson had already published a book on mechanics and optics and he illustrated his lectures**

using a variety of machines and instruments.

- The device in this painting is one of those instruments, it is an orrery, a mechanical model that moved and showed the motion of the planets around the sun. In place of the sun was a lamp which is the sole source of illumination in this painting. We know Ferguson designed several orreries for use in his lectures.
- The painting was bought by the 5th Earl Ferrers, an amateur astronomer who owned an orrery himself. As an aside, he was the brother of Laurence Ferrers the 4th Earl and the last nobleman to be hanged for murder. We do not know for certain who all the figures are but we think the 5th Earl is on the far right and the man taking notes on the left was a friend of Wright.
- The puzzle is the name of the philosopher giving the lecture. It should be James Ferguson, as I said, one of the most famous touring lecturers of the period. (CLICK) However, his appearance is different as we can see from this engraving of the period. Another suggestion is that it is Sir Isaac Newton (1643-1727) (CLICK). He had died 40 years before but his law of universal gravitation explained planetary motion. It is easier to match the faces if I reverse his picture (CLICK). As you can see Newton had a thinner face, a thinner nose and wider set eyes.
- At this time, most artists focused on portraits as that was where the money was but Wright became the first painter to represent the 'modern' world and (CLICK) in this cleverly lit scene he has captured the excitement of the age and the interest of both the young and the old in science.

NOTES

- **The Age of Romance 1750-1850**
- The Scientific Sublime: Wright of Derby, a philosopher giving that lecture on the orrery in which a lamp is put in place of the Sun.
- The Age of Enlightenment - experiment, observation and reason.
- The regular movement of the heavens is being demonstrated but this is also high drama. Knowledge is revealed through theatre.
- **Art and science are allies.**
- The money was in portraits but Wright became the first painter of the Industrial Revolution, he was a 'modern' painter who caught the excitement of the age.
- Technology rapidly transformed Britain from a rural agricultural economy to a modern manufacturing economy.
- The first iron bridge was built.
- Factories were powered by the new almost magical source of unlimited power—steam.
- Derby was the centre of cotton and silk mills.
- Erasmus Darwin, Wedgwood and many others met in the monthly Lunar Society, held at full moon so the members could see their way back.
- 4th Earl of Orrey
- Wonder—the scientific sublime.
- God? Created this mechanical creation.
- Society of Artists of Great Britain.
- Richard Arkwright.
- Founded on the artisan, whose skill was the foundation of the new age.

References

<https://www.revolutionaryplayers.org.uk/a-philosopher-lecturing-on-the-orrery-1764-1766/>



Philippe Jacques de Loutherbourg, *Coalbrookdale by Night*, 1801, 67.9 x 107 cm, Science Museum

Philippe Jacques de Loutherbourg (French, Strasbourg 1740–1812 London), *Coalbrookdale by Night*, 1801, 67.9 × 107 cm, Science Museum

- Moving on 35 years, this was painted in 1801, the beginning of the age of iron and steam and Coalbrookdale was the iron capital of England. It is now known as Ironbridge. At the time the town was seen as a demonstration of the wonders of science. One journalist at the time wrote, "Coalbrookdale is a very romantic spot ... the noise of the forges, mills et cetera with all their vast machinery, the flames bursting from the furnaces with the burning of the coal and the smoke of the limekilns are altogether sublime".
- As you can see the word Romantic had a different meaning from today, it was not concerned with the loving relationship between couples but with things that invoked strong emotions and feelings in contrast with the Enlightenment, the Age of Reason which rejected emotion as a source of knowledge. The

Romantic is often associated with dark forests and towering mountains but, as we see here, it was also a reaction to the wonders of science.

- The town was popular with tourists who were entertained by a type of theatre of technology, there were designated viewpoints and seating to take it all in. Artists flocked there including Joseph Mallord William **Turner**, Thomas Rowlandson, **John Sell Cotman** and **Philippe Jacques de Louthembourg** (pronounced 'luther-borg') who painted this work which is now in the Science Museum.

NOTES

- **The Age of Romance**
 - Masters of Spectacle: Smelting in Shropshire.
Coalbrookdale by Night to Louthembourg
 - "Coalbrookdale is a very romantic spot. Indeed too beautiful to be matching in unison with that variety of horrors art has spread at the bottom: the noise of the forges, mills et cetera with all their vast machinery, the flames bursting from the furnaces with the burning of the coal and the smoke of the limekilns are altogether sublime, and would unite well with the craggy and beer rocks." Agricultural journalist, Arthur Young, 1776
 - Bedlam furnaces.
 - River Severn, Shropshire.
 - The age of iron.
 - Coalbrookdale was an iron capital. It is now known as Ironbridge.
 - It was industrial in the 16th century and early works can be traced back to the 13th century.

- Abraham Derby used coke to boost production. He produce iron 'pigs'.
- The iron bridge was built in 1776-79 of iron. It was designed using the same type of joints as are found in wooden bridges. It became a wonder for tourists to see in the 18th century.
- The name Bedlam was named after a local house not the London madhouse.
- It was popular with tourists who were entertained by a type of theatre, there were displays and viewpoints and seating.
- Artists flocked there including Turner, Rowlandson, Cotman, Loutherbourog.
- Loutherbourog studied in Paris and was influenced by Vernet. He became Painter to the King in 1776 and advisor ar Drury Lane Theatre. He designed sets and worked with David Garrick and Sheridan.
- 1781 he set up the Eidophusikon at his house near Leicester Square. Moving pictures for five shillings a ticket.
- He designed a three-day party come orgy for W. Beckford at Fonthill. A black mass was held. There was a seduction scandal and he was exiled for ten years.
- Fires of Hell at Coalbrookdale.
- The Eidophusikon was destroyed by fire in 1800.
- Bedlam furnaces, natural spectacle, industrial drama and the mystical fires of Hell.

The only known image of an
Eidophusikon performance,
c. 1781



The only known image of an Eidophusikon performance, c. 1781

- **de Louthembourg (1740-1812) was a French artist who studied in Paris before moving to London where he was paid £500 a year to design scenery and costumes for David Garrick.**
- **He is also known for his spectacular entertainment called the Eidophusikon (pronounced 'ido-foos-econ'), meaning "image of nature". This was a miniature mechanical theatre of moving parts and changing coloured lights. It was thought up by David Garrick and created by de Louthembourg and was six by eight feet. It presented scenes from nature, mythology and the Bible to an audience of about 150 people. The scenes included sunrises and sunsets, moonlight images, storms, shipwrecks and volcanoes from all over the world with sound and music effects. It was an exciting new technology that people flocked to see. It was the first time moving images had been shown in a theatre and it made de Louthembourg famous.**

REFERENCES

- <https://en.wikipedia.org/wiki/Eidophusikon>
- <https://www.youtube.com/watch?v=ILWxH09tVJQ>



James Gillray, *Scientific Researches! - New Discoveries in Pneumatics! - or - an Experimental Lecture on the Powers of Air*, 1802

- There was an amusing side to science. James Gillray was one of the most talented and biting satirists of the eighteenth century. Here he turns his attention to the recently established (founded 1799) scientific association, the Royal Institution. (CLICK) At one level it is not subtle, it is a fart joke. However, there was a serious side as, at the time, many of the scientists who worked on gases, such as Joseph Priestley, were political radicals who supported the French Revolution. One of the exciting discoveries was the effect of nitrous oxide but the research became associated in the public's mind with radical politics and revolution and we think that partly as a result of this cartoon, research on nitrous oxide stopped. (CLICK)
- The person assisting with the bellows is Humphrey Davy and he was the first to try nitrous oxide in 1798. It was thought then to

be poisonous so he must have had a very boring Christmas because on Boxing Day he had himself sealed in a large airtight box to which an assistant introduced a large volume of nitrous oxide.

- He experienced the effects of a mind-altering drug. He wrote *"... my visible impressions were dazzling and apparently magnified, I heard distinctly every sound in the room, and was perfectly aware of my situation. By degrees, as the pleasurable sensations increased, I lost all connection with external things; trains of vivid visible images rapidly passed through my mind and were connected with words in such a manner as to produce perceptions perfectly novel.*
- *"I existed in a world of newly connected and newly modified ideas. I theorized; I imagined that I made discoveries."* As he slowly recovered from the experience he tried to recall the amazing discoveries but all he could say to his assistant was *"Nothing exists but thoughts! The universe is composed of impressions, ideas, pleasures, and pains."*
- A very early psychedelic experience.

NOTES

- **Satirising Science.** Gill Ray and laughing gas
- Royal Institution founded 1799 was Gillray's satirical target.
- One of the attendees described the audience as **"men of the first rank and talent ... blue-stockings and women of fashion."** An audience ripe for satire.
- Many people in the audience can be identified. In the audience are on the left Mr Denys and his little boy with Miss Denys. In front of them Mr Sotheby, taking the gas Sir John Hippley, administering the gas Dr Thomas Garnett, lecturer from 1799 to 1801 or Thomas Young who succeeded him in

July 1801, in front Lady Charlotte Denys, on her right Miss Lock and to her right Sir Henry Englefield. To the right of the bench is Humphrey Davy (1778-1829) Thomas Young's assistant lecturer from July 1801. On the right from top to bottom are Count Romford (Benjamin Thompson, founder of the Royal Institution), Dr Isaac Disraeli, Earl Gower, Lord Stanhope and Lord Panfret.

LUKE HOWARD'S THREE BASIC CLOUD TYPES



Stratus - 'spread out'



Cumulus - 'heaped'



Cirrus - 'lock of hair'

- **Switching from chemistry to meteorology** (from the Greek, 'study of the atmosphere'). **Before the nineteenth century clouds were regarded as individual and unclassifiable. All this changed in 1803 when Luke Howard, a British chemist and an amateur meteorologist, presented an essay on the classification of clouds. It was Howard who proposed the names we still use today— stratus meaning 'spread out' and 'layered', cumulus meaning 'heaped' and cirrus meaning like a 'a lock of hair'. They are found at different heights, stratus is the lowest, what we call an overcast sky, then cumulus, sometimes called fair weather clouds and much higher are cirrus, often a portent of an approaching warm front. He also divided each type into upper and lower forms and named blended versions such as cumulostratus, a combination of stratus and cumulus.**
- **As an aside, a word I learnt while researching Luke Howard was nephology, the scientific study of clouds from the Greek *nephos* meaning cloud.**

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- He also named nimbus (meaning 'dark cloud') which was a complex blending of stratus, cumulus and cirrus. In 1932 nimbus was renamed nimbostratus. Today there are many other types of unusual cloud formation and sub-types of each cloud type but Howard's basic formulation and names remain.
- Biologist Jean-Baptiste Lamarck (1744–1829) proposed a list of descriptive terms in French the same year that Howard presented his essay, containing five terms, four of which overlapped with Howard's system. However, Lamarck published in an obscure journal with no pictures and his work was denounced by Napoleon.

REFERENCES

Tate <https://www.tate.org.uk/art/artworks/constable-cloud-study-n06065>

John Constable (1776-1837), *Study of Cirrus Clouds*, c. 1822, 11.4 x 17.8 cm, Victoria and Albert Museum



John Constable (1776-1837), *Study of Cirrus Clouds*, c. 1822, 11.4 x 17.8 cm, Victoria and Albert Museum

- Twenty years later John Constable was establishing himself as one of the finest English landscape painters and between 1821 and 1822 he recorded over a hundred sketches of clouds over Hampstead Heath. Constable described the process as 'skying' and this is one of his studies of cirrus clouds. Constable had moved to Hampstead in 1819 for his wife's health as it was then in the country yet he could walk into central London in just over an hour.
- Constable regarded these cloud paintings as a scientific study, he wrote, "*Painting is a science, and should be pursued as an enquiry into the laws of nature. Why then, may not landscape be considered as a branch of natural philosophy, of which pictures are but the experiments?*" An interesting thought, of which more later.
- It was an important period for Constable. He had married six

years previously against the wishes of his wife's grandfather and it was not until three years after his marriage (1819) that he sold his first important painting (*The White Horse*, for 100 guineas to his friend John Fisher). He then started on a series of six six-footers that became the defining works of his career. In 1821 his most famous six-footer, *The Haywain* was exhibited at the Royal Academy and although it failed to find a buyer it was exhibited at the Paris Salon where it caused a sensation and won the gold medal. It is thought to have influenced a whole generation of young French artists including Eugène Delacroix (1798-1863), the leading French Romantic painter.

NOTES

- **Observing the Air. John Constables clouds**
- “Constable’s oil studies of skies show a remarkable understanding of the structure and movement of clouds. Most also give a good impression of their three-dimensional volume.
- The studies vary in size. This is one of only four examples he painted on a larger format. The larger the scale the more difficult Constable found it to balance crispness of detail with speed of execution. This is why the larger cloud studies tend to be more generalised. The inscriptions on the back – ‘11 o’clock’ and ‘Noon’ – indicate that this study took him about an hour to paint.” (Tate Display Caption)

Tate <https://www.tate.org.uk/art/artworks/constable-cloud-study-n06065>



J. M. W. Turner (1775–1851),
Rain, Steam and Speed – The Great Western Railway, 1844, 91
× 121.8 cm, National Gallery



J. M. W. Turner (1775–1851), *Rain, Steam and Speed – The Great Western Railway*, 1844, 91 × 121.8 cm, National Gallery
George Cruikshank, *The Railway Dragon*, 1845, 26 × 18 cm, British Museum

- The first half of the nineteenth century was a time of enormous changes. This well-known painting by Turner captures the dichotomy many people felt between the wonders of science on the one hand and the impact on the old world they were leaving behind on the other. A dichotomy that is still with us.
- (CLICK) In front of the train there is a hare running away demonstrating the wondrous speed of the train, faster than the fastest mammal in Britain but also warning of the dangers of technology as the hare is about to be killed.
- (CLICK) On the bank of the Thames is a group of dancers dressed on robes invoking the old world of village pleasures ruined by the new bridges and railway lines and the noise, smoke and pollution of the new world.

- To illustrate the fear many people felt about the train look at this engraving from 1845, *The Railway Dragon* by George Cruikshank. A terrifying and anthropomorphic railway engine entering the dining room of a family, as they celebrate Christmas, the machine eats their meat and Christmas pudding, smoke belching from its mouth, the family flee in terror or shout in shock as the train shouts "*I come to dine, I come to sup, I come, I come ... to eat you up*".

NOTES

- **Tracking Progress.** Turner in the age of steam, *Rain, Steam and Speed*
- Rain, Steam and Speed - The Great Western Railway; the painting depicts an early locomotive of the Great Western Railway crossing the River Thames on Brunel's recently completed Maidenhead Railway Bridge. The painting is also credited for allowing a glimpse of the Romantic strife within Turner and his contemporaries over the issue of the technological advancement during the Industrial Revolution (see below).



Anna Atkins (1799-1871), *Dictyota dichotoma*, in the young state; and in fruit, 1843-53, cyanotype



Anna Atkins (1799-1871), *Dictyota dichotoma*, in the young state; and in fruit, 1843-53, cyanotypes, the plant is a seaweed also known as forkweed

- In the early part of the nineteenth century photography was invented and over the course of the century this completely changed the way the world was seen and recorded. Photography became the recording instrument of science not painting as Constable had hoped just twenty years previously. The mainstay for many artists had been portraiture and as photographic studios blossomed they dramatically undercut the cost of recording loved ones. Many artists lost their main source of income and became photographers.
- This image is produced without a camera. The plant is put in direct contact with the sensitive emulsion and exposed to light. (CLICK) Anna Atkins was an English botanist and the photographer of these seaweeds. She is often considered the first person to publish a book illustrated with photographic

images and some sources say that she was the first woman to create a photograph although this may have been Constance Fox Talbot. We know Atkins had access to a camera by 1841 but no camera-based photographs by her survive, nor are there any surviving photographs by Constance Talbot, so the issue may never be resolved.

- In 1843 Atkins published *Photographs of British Algae: Cyanotype Impressions* with cyanotypes used to illustrate British seaweeds. Only a limited number of editions were produced with handwritten text and so there are few surviving today. Check if you have one in the attic as in 2004 one copy sold for nearly a quarter of a million pounds (£229,250).
- By the way, a cyanotype is photograph produced using iron compounds that result in cyan-blue print. Engineers used the process well into the 20th century as a simple and low-cost process to produce copies of drawings, they were known as blueprints.

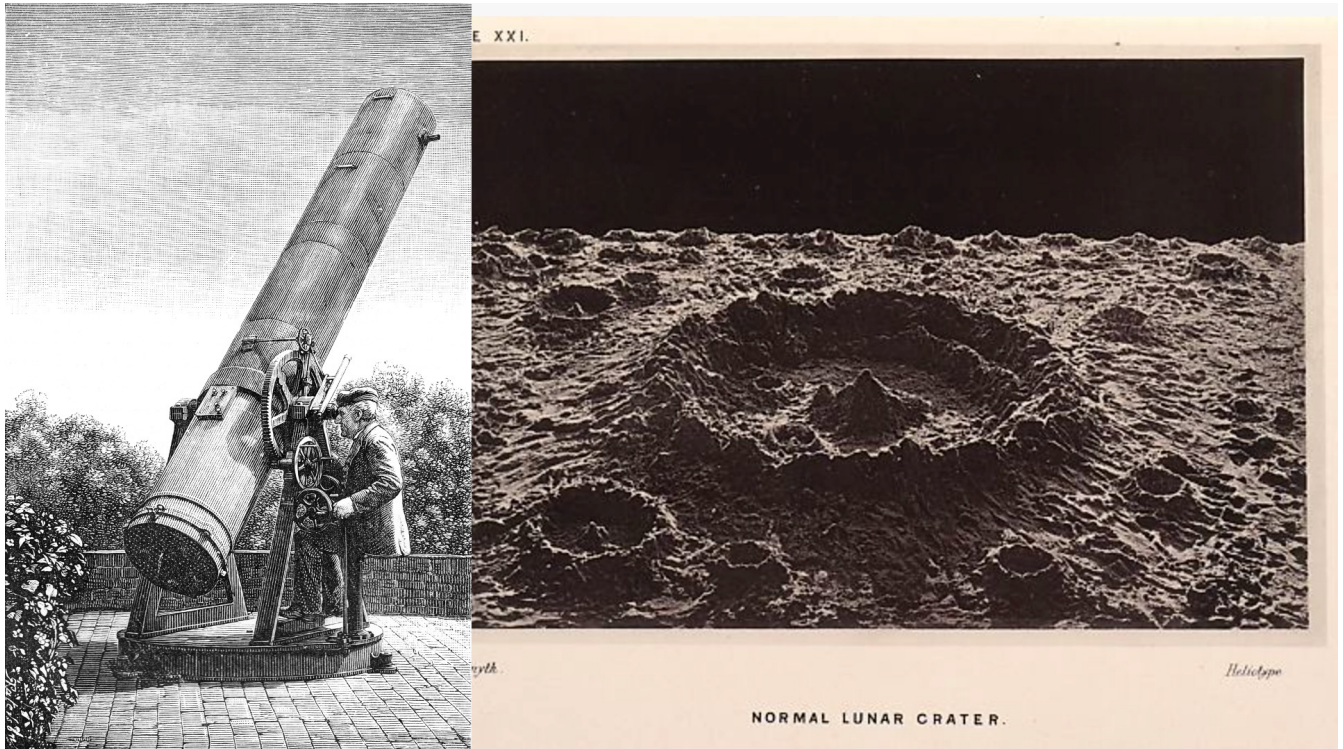
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Plants on Paper: *The Art of Botany*, Joseph Lister, Anna Atkins, William Henry Fox Talbot

- A photogram of Algae, made by Anna Atkins as part of her 1843 book, *Photographs of British Algae: Cyanotype Impressions*, the first book composed entirely of photographic images.
- Anna was born in Kent, southeast England, in 1799. She was raised by her father John George Children, who worked at the British Museum.
- Anna Atkins (née Children; 16 March 1799 – 9 June 1871) was an English botanist and photographer. She is often considered

the first person to publish a book illustrated with photographic images. Some sources claim that she was the first woman to create a photograph.

- Dictyota dichomata or forkweed is a brown algae found in the temperate western and eastern Atlantic Ocean, the Mediterranean Sea, the Black Sea, the Red Sea and the western Indian Ocean.
- Cyanotype is a photographic printing process that produces a cyan-blue print. Engineers used the process well into the 20th century as a simple and low-cost process to produce copies of drawings, referred to as blueprints. The process uses two chemicals: ferric ammonium citrate and potassium ferricyanide and the exposure time varies from a few seconds in bright sunlight to 10-20 minutes on a dark, gloomy day. Sir John Herschel discovered the process in 1842. The reaction of the iron with the ferricyanide produces Prussian blue.



James Hall Nasmyth (1808–1890), '*Normal Lunar Crater*', in *The Moon: Considered as a Planet, a World, and a Satellite*, 1874, heliotype, 28.5 × 23 cm, Met Museum

- James Nasmyth made a fortune from his invention of the steam hammer but the prize he received at the Great Exhibition of 1851 was not for his steam hammer but for his six-foot square painting of the moon.
- In 1874 he published a book called *The Moon: Considered as a Planet, a World, and a Satellite*. The book contained twenty-one images of the lunar surface many of which were photographs. Since the Enlightenment many believed that closely observing and recording God's world was a deeply moral activity, this 'truth to nature' had an intrinsic value beyond its use as a scientific record. Photography was seen to offer an objective, untainted view of the world.
- But how did Nasmyth take photographs of the moon? Although critics wrote eloquently of being transported to the surface of

the moon the photographs were actually of plaster models. Nasmyth would sketch a crater while looking through his telescope (CLICK) and then make a model from Plaster of Paris and photograph it using raking sunlight. Nasmyth adopted the method from his father, a well-known Scottish landscape painter who used plaster models as studies for his paintings in order to recreate the moon's surface. **The telescope was of his own design and is still known as the Cassegrain-Nasmyth telescope and is the basis of many modern reflecting telescopes.**

NOTES

- **Section 2: The Age of Enthusiasm 1850 to 1940: New Ways of Seeing**
 - **Reaching for the Moon: the Truth about Photography**
 - James Hall Nasmyth (sometimes spelled Naesmyth, Nasmith, or Nesmyth) (19 August 1808 – 7 May 1890) was a Scottish engineer, philosopher, artist and inventor famous for his development of the steam hammer. He was the co-founder of Nasmyth, Gaskell and Company manufacturers of machine tools. He retired at the age of 48, and moved to Penshurst, Kent where he developed his hobbies of astronomy and photography.



Silk skirt and blouse dyed with Sir William Henry Perkin's Mauve Aniline Dye

- **William Perkin (1838-1907) was an assistant to the famous chemist August Hofmann who challenged him to produce the anti-malaria drug quinine artificially. Quinine was expensive as it had to be isolated from the bark of the cinchona (pronounced 'sin-choner') tree found only in Peru. Perkin failed to make quinine but (in 1856) during the experiment he noticed the solution was purple. Rather than throw it away he put some silk in the solution and found it coloured the silk and did not wash out. Through serendipity he had discovered the first aniline, also called a coal-tar, dye.**
- **Perkin did not miss the opportunity. He knew purple was an extremely expensive dye to produce. It had been worn by the aristocracy from ancient times and was made from the glandular mucus from tens of thousands of a certain type of rock snails. So, Perkin borrowed money from his father, a**

carpenter, patented the dye he called Mauveine and opened a factory to make it. When Queen Victoria and Empress Eugénie, wife of Napoleon III were seen wearing mauve it became fashionable and Perkin became wealthy. (CLICK) Over the course of the nineteenth century a whole spectrum of bright, washable coal-tar dyes were produced. They also led to developments in medicine. In 1891 certain dyes were found to be absorbed by bacteria and in high doses it killed them. This led to the first use of a chemical to selectively kill a bacteria and to a treatment for syphilis and for malaria.

NOTES

- **Dying to Display: Variety and Vibrancy.**
- William Henry Perkin and mauveine, the first synthetic organic dye. Previously clothes were beige and brown. Colourful clothes were a sign of wealth.
- “In 1853 the young chemist William Perkin entered the Royal College of Chemistry, now part of Imperial College London, as a student supervised by August Wilhelm Hofmann. A year later, at only sixteen years old, Perkin assembled a laboratory at his home on Cable Street in east London where he started independent research. Perkin sometimes collaborated with Arthur H. Church, a talented painter who was interested in the chemistry of paint.
- By 1856 Perkin had become Hofmann’s assistant and Hoffmann challenged him to synthesize quinine, an expensive natural substance much in demand for the treatment of malaria. Perkin started by reacting a salt of allyltoluidine with potassium dichromate. **The experiment failed.** Repeating his method but trying different a salt, aniline, Perkin’s obtained a purple solution while cleaning

out the flask with alcohol, which seemed to dye silk very easily. The colour remained in the silk even after washing the fabric. This was the first aniline or coal-tar dye to be discovered.

- Perkin collaborated with his brother Thomas and his friend Arthur; together they carried out further trials on the dye and sent samples to Robert Pullar in Perth, who worked in the family firm of Pullars Dyeworks. Perkin filed a patent for this process (patent no. 1984 of August 1856).
- Perkin's mauveine quickly became popular after he borrowed money from his father to establish a factory, invented a way for the dye to be used on cotton as well as silk and gave advice to the dyeing industry on how this new synthetic dye worked.
- Public demand increase when Queen Victoria and Empress Eugénie, wife of Napoleon III were seen in the colour.” (Science Museum website)
- Many new dyes were developed leading to a low cost, rainbow of colours affordable by everyone.
- Coal tar is a by product of the production of coke and coal gas from coal. It was discovered it had medicinal properties in the early 1800s but it was not until the 1850s that it was discovered it could be used as the basis of a number of dyes and this created an entire industry.
- Methylene blue was identified by Paul Ehrlich about 1891 as a possible treatment for malaria. It stopped being used during World War II as an anti-malarial drug as it had an annoying but benign side-effect. It turned their urine blue or green and the whites of the eyes blue. Interest in its use as an anti-malarial has recently been revived.



Théodore Géricault (1791–1824), *The 1821 Derby at Epsom*, 1821, 91 × 122 cm, Louvre Museum

Eadward Muybridge (1830-1904), *Horse in Motion*, 1878

- **Everyone believed that when a horse galloped all its legs left the ground at the same time as you can see from this painting by Théodore Géricault.**
- **In 1872 a railway baron called Leland Stanford, who later founded the university of the same name, allegedly made a bet, some say of \$25,000, on this being true. He hired the noted photographer Eadweard (christened Edward Muggeridge) Muybridge (pronounced "Edward My-bridge") to find out. After many failed experiments Muybridge rigged up a dozen cameras along the ground each triggered by a string. He then got a horse to gallop through the strings and this triggered all the cameras, one after the other. (CLICK) You can see from the series of photographs that the horse does have all four feet off the ground but not when you might expect. It is when when the**

legs are brought together as you can see in the second photograph not when they are stretched out. (CLICK) By presenting the photographs rapidly a moving image is produced. The photographic process, which originally took hours of exposure time, then minutes and finally fractions of a second had become fast enough to stop time.

- **Muybridge was born in Kingston-upon-Thames and emigrated to America when he was 20. (CLICK) He captured the public's imagination with his pictures of frozen motion and he produced hundreds of thousands of images and later (in 1887) published a book (of 11 volumes and 781 plates) that cost a staggering \$600 (over \$17,000 in 2021) and contained over 19,000 individual images. In 1874 he shot and killed his young wife's lover but the jury ignored the judge's direction and acquitted him on the grounds that they would have done the same thing themselves.**
- **(CLICK) In 1882 he lectured at the Royal Institution in London in front of a sell-out audience, which included members of the Royal Family. He displayed his photographs on screen and showed moving pictures projected by his zoopraxiscope. Within a few years the first movie films were being produced.**
- **(CLICK) Muybridge retired to his birthplace (in 1894), Kingston, and died in 1904. He donated his papers, photographs and equipment to the Kingston Library and they are now on show in Kingston Museum. This is his house at 2 Liverpool Rd, Kingston near the entrance to Richmond Park. It has a blue plaque outside but cannot be visited.**

NOTES

Capturing Time: Vision versus Realism. Oscar Gustaf Rylander,

Muybridge

- The Horse in Motion by Eadweard Muybridge. Noted photographer, Eadweard Muybridge was hired, in 1872, by Leland Stanford a railroad baron and future university founder, to find out if there was moment mid-stride where horses had all hooves off the ground. It took several years but Muybridge delivered having captured a horse, named "Sallie Gardner," owned by Stanford; running at a 1:40 gait over the Palo Alto track, on 19th June 1878. Muybridge used a dozen cameras all triggered one after another with a set of strings.
- In 1872 Muybridge was found not guilty of murdering his wife's lover as the jury gave a verdict of 'justifiable homicide'.



First telephone, an actor portraying Alexander Graham Bell in a 1926 silent film. Shows Bell's first telephone transmitter (microphone), invented 1876 and first displayed at the Centennial Exposition, Philadelphia

Guglielmo (pronounced 'gwee-el-mo') Marconi with one of his first radio sets

Cinema, Gaumont Palace, Paris, 1912. The oldest commercial cinema chain, now spanning 4 continents

Aeroplanes, Wright brothers first powered flight in the Wright Flyer at Kitty Hawk, North Carolina, US, on 17 December 1903

Racing cars, The Vanderbilt Cup Race of 1906, No. 11 Mercedes 120 driven by Foxhall Keene did not race, No. 10 a Darracq 120 HP driven by Luois Wagner came first (297 miles in 4h50m10s)

1886 Starley 'Rover' Safety Cycle, British Motor Museum

Umberto Boccioni (1882–1916), *Dynamism of a Cyclist*, 1913, 70 × 95 cm, Peggy Guggenheim Collection

- The end of the nineteenth century was marked by a series of

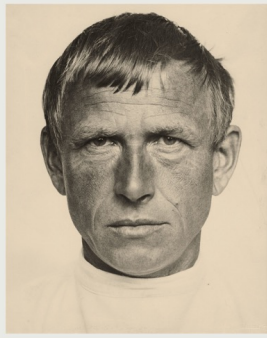
spectacular inventions—the telephone, radio, cinema, aeroplanes and high-speed vehicles. Not only did they transform ideas of distance and accessibility they eroded gender and class barriers.

- Of all these inventions the one that perhaps had the greatest impact on society at the time can be seen in one of these photographs, yes, it was the humble bicycle. Previous bicycle designs such as the penny-farthing required impressive feats of balance and daring to ride so their appeal was limited.
- The safety bicycle today looks simple but it required thirty years of research and development in Britain and France. It was in Coventry in 1885 that John Kemp Starley (1855-1901) launched the first Rover safety bicycle. It was a huge success and set the standard for bicycle design across the world up to the present day.
- Initially cycling was limited to the aristocracy and to wealthy young men and women but the price dropped very quickly creating a bicycle boom in the 1890s. In 1892 *The Times* commented that the bicycle was not just a social boon but a social revolution. Men and women could escape for the day, people could travel further to work, use the bicycle to deliver goods and travel writers even cycled all over Europe.
- The freedom, love of speed and the wonders of the modern world led to Filippo Tommaso Marinetti (1876-1944) proclaiming his *Futurist Manifesto* in 1909. His emotive language inspired many artists such as Giacomo (pronounced 'Jack-a-mo') Balla, Carlo Carra and Umberto Boccioni (pronounced bo-choney') to sign the Futurist Manifesto. This painting of a cyclist illustrates a line from their manifesto "we declare that the world's splendour has

been enriched by a new beauty: the beauty of speed."

NOTES

- **Celebrating Speed: Mobility and Maternity.**
 - The bicycle, Umberto Boccioni



Otto Dix (1891-1969),
The Skat Players, 1920, 87 × 110 cm,
Alte Nationalgalerie, Berlin, Germany



Otto Dix (1891-1969), *The Skat Players*, 1920, 87 × 110 cm, Alte Nationalgalerie, Berlin, Germany

Otto Dix (1891-1969, aged 77), photograph by Hugo Erfurth, c. 1933

- **World War I was the first war to experience the horrors brought about by the use of new technologies, from mustard gas to powerful new explosives.**
- **Artists found it difficult to deal with the horrors of the war and felt that it had made the artistic innovations before the war, such as Symbolism, Cubism and Futurism, seem irrelevant. Many artists returned to a conventional style of painting referred to as the 'return to order'.**
- **One exception was Dada which used art to expose the horrors of the war and one of the leading artists of the 'New Objectivity' movement in Germany was Otto Dix. A recurring theme of his work were wounded and crippled war veterans and one of early post-war paintings was this one—*The Skat***

Players. He exposed the mutilation and depravity of the Weimar Republic by depicting things realistically rather than symbolically. The only thing left for the disabled and unemployable war veterans was to pass the time playing cards. The public wanted little to do with them as they reminded everyone of Germany's defeat.

- The prosthetics, hearing aids, and glass eyes depict the ironic way that technology, which first dismembered them, was then used to patch them up. On the artificial jaw of the soldier with an iron cross on the right it reads, translated, "lower jaw prosthesis brand Dix". Otto Dix won the iron cross during the war so the text personalises the image and shows his identification with these rejects from society.

NOTES

- Otto Dix (1891-1969) was one of the most important artists of the Dada and Neue Sachlichkeit [New Objectivity] movements. Wounded and crippled World War I veterans are a recurring theme in his work. The card players, fitted with prosthetic arms and legs, depict the German elite during the Weimar era.
- "One of Dix's early post-war paintings, which displays the harsh reality of the Weimar Germany in the style of the New Objectivity movement, is *The Skat Players* painted in 1920. After Germany's defeat in the First World War, the day-to-day life turned into a grotesque display of mutilated, shell-shocked, and depraved members of society. Dix's way of getting across his belief of the degrading post-war life was through usage of less symbolism, and more realistic notions, specific for the New Objectivity. The artist wanted to make a clear statement in regard to the damage and destruction the

war can do to society, treating the matter in a detached way, showing both a satirical attitude and a serious side of things.

- In this painting, Dix presents the war as a gamble, a skat game between the crippled and deformed soldiers, expressing the shocking new reality of that time. Three disfigured soldiers represent the new stereotype of the Weimar Republic: the unemployable and miserable war veterans that are disposed by the working class based society after serving for their country. Without a purpose or a place in life, viewed only as a token of the German defeat, the only thing left for the veterans is playing cards and passing time with fellow soldiers.
- Besides giving shape to terror, Dix painted this tableau to illustrate the dehumanizing effects a war has on people, stripping them of all their senses, as the characters are portrayed deaf, blind, burnt, and crippled. The fact that the soldiers have patches and numerous aiding devices sends the viewer into the era of industrialized war. The prosthetics, hearing aids, and glass eyes depict the misuse of technology and industrial progress for the soldiers disabled in the war. To add a personal touch to the artwork, and to show a personal view of the matter, Dix left a small self-portrait within the painting alongside a marking that says 'unter kiefer prothese marke Dix' meaning 'lower jaw prosthesis brand Dix'. The interesting fact is that Dix left this mark on the soldier that had an Iron Cross decoration, a medal which was awarded to the artist himself during the war, therefore showing empathy toward his subjects and identifying with them.” (Wikiart website)
- Skat is a a three-handed trick-taking card game with bidding, originating in Germany.



Laurence Stephen Lowry (1887–1976),
A Manufacturing Town, 1922,
43.2 × 53.3 cm, Science Museum



Laurence Stephen Lowry (1887–1976), *A Manufacturing Town*, 1922, 43.2 × 53.3 cm, Science Museum

- This shows the way that industrialisation led to pollution and dirt. This is one of the first works by Lowry to receive public recognition when it appeared in a supplement to the *Manchester Guardian* in 1926. The supplement was to promote worker pride following the recent General Strike (4-12 May 1926).
- Lowry is illustrating no particular place but it is similar to his native Salford. The artist combines elements of factory buildings, mine heads, smoking chimneys, busy street life and civic pride. The anonymous figures scuttling around seem to imply that the human workers have been reduced to machines or mere units of production within the capitalist system.
- Lowry lived in Pendelbury, just north of Salford for 40 years with his mother. She did not appreciate his painting and he worked full-time as a rent collector and only painted after ten

at night. An interesting quote from Lowry in 1970 is "*I look upon humans beings as automatons ... because they all think they can do what they want but they can't. They are not free. No one is.*"

NOTES

- **Humans in the Industrial Machine: Smokestacks in Salford.**
LS Lowry and *Manufacturing Town*
- "The painting shows an industrial cityscape, of no place in particular but in the spirit of a northern town such as the artist's native Salford. It is an early work with a dark background, painted before Lowry was encouraged to lighten the sky. The artist combines elements of factory buildings, mine heads, smoking chimneys, busy street life and civic pride." (Art UK website)
- **Laurence Stephen Lowry** RBA RA (1 November 1887 – 23 February 1976) lived in 117 Station Road, **Pendlebury**, Lancashire, from 1908, when he was 22 to 1948 when he was 61, and the area around was the subject of many of his paintings for more than 40 years. He painted **mysterious unpopulated landscapes**, urban landscapes populated by 'matchstick people', **brooding portraits** and the unpublished 'marionette' works that were only found after his death. His **father was a clerk** and a 'cold fish' and his **mother was a talented pianist** but in poor health. She wanted a daughter rather than a 'clumsy boy' and she was controlling and intolerant of failure. He had an **unhappy childhood** and his parents **never appreciated** his artistic talent. He made **few friends** at school and showed **little academic aptitude**. After school he started work as a **rent collector** and spent his **evenings learning to draw** and in 1905 he attended

Manchester School of Art where he came into contact with **French Impressionism**. Between 1915 and 1925 he studied at the **Royal Technical Institute**, Salford. He cared for his **sick mother** until she **died in 1939** and so could only **paint after 10pm**. In WWII he became a **volunteer fire fighter** and **war artist**. After the war his landlord repossessed his neglected house so he bought another. He had a large collection of clocks. He made many friends but later in life avoided strangers and kept a suitcase by his front door so he could walk out on callers. He claimed he was a **simple man** who could **not appreciate modern art** but he **admired René Magritte** and **Lucian Freud**, although he admitted that he "**didn't understand**" **Francis Bacon's** work. When he **became more wealthy** he acquired paintings and drawings by Pre-Raphaelite artist Dante Gabriel **Rossetti** who he described as his **chief inspiration**.

- In April 1955 Lowry was elected as an Associate Member of the Royal Academy of Arts and in April 1962 became a full **Royal Academician**.
- **Lowry was a shy** and **secretive** artist who **remained unmarried** until his death, at the **age of 88**, Lowry once admitted that he had "**never had a woman**". He was a **keen ballet-goer** who regularly attended performances by the Royal Ballet at **Covent Garden** and in his home city of Manchester. He **rejected five honours** in his life including a knighthood and so he hold **the record for the most rejected British honours**. There was a major retrospective at the Tate in 2013 and his first solo exhibition outside the UK in China in 2014.
- Quotations:
 - "I wanted to paint myself into what absorbed me ...

Natural figures would have broken the spell of it, **so I made my figures half unreal.**"

- "You don't need brains to be a painter, just feelings."
- "I am not an artist. I am a man who paints."
- "This art is a terrible business."



Théodore Olivier (1793–1853), mathematical model. Olivier was a French mathematician.

Dame Barbara Hepworth (1903–1975), *Sculpture With Colour and String*, 1939/1961, bronze with a light brown and light green patina and string, 24.8 cm, signed with a monogram and numbered '1/9', The Ingram Collection

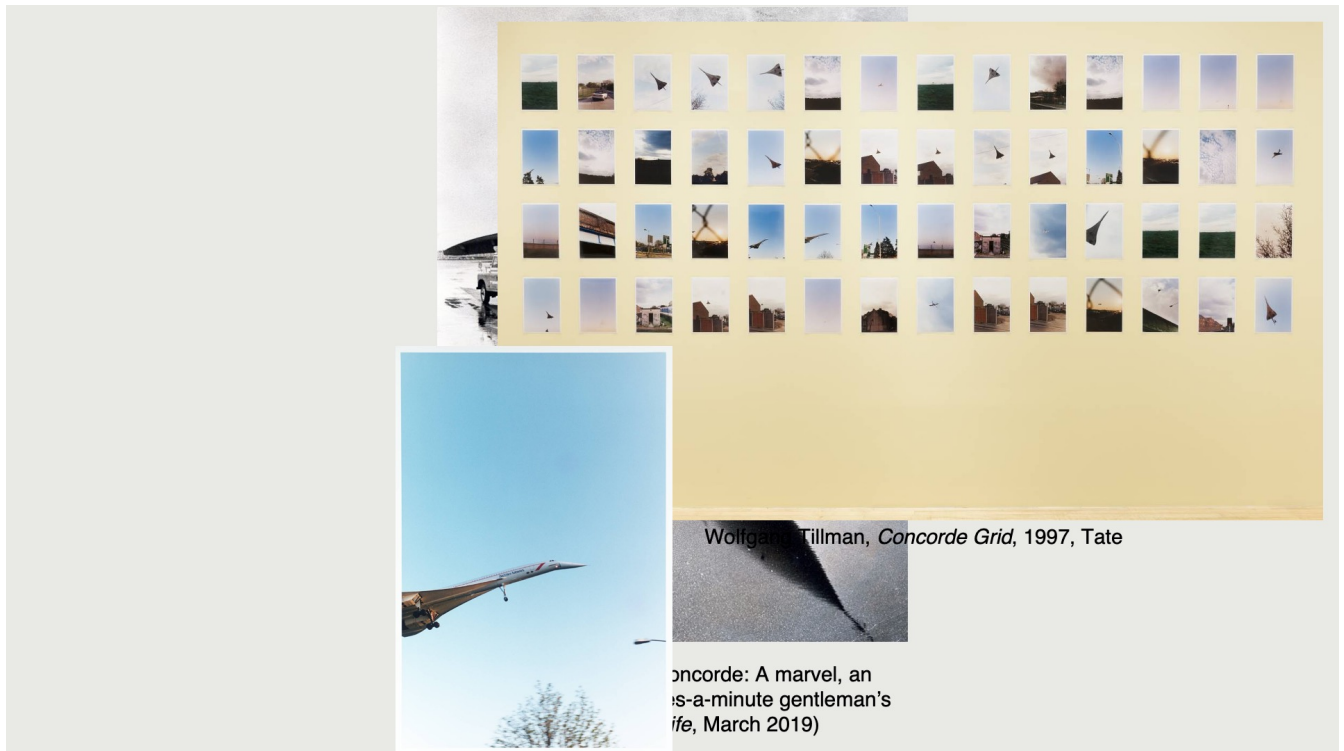
- **When teaching mid-nineteenth century mathematics it was common practice to use models to illustrate complex three-dimensional surfaces. But as well as their educational use, artists such as Barbara Hepworth and Henry Moore found they had an aesthetic appeal and were inspired to incorporate the forms in their own work.**
- **Henry Moore began an extensive series of sculptures using string from 1937 and he is often considered the first. However, his friend Naum Gabo the Russian-born artist came across mathematical models at his college in 1910. It is generally assumed that Barbara Hepworth was influenced by both Moore**

and Gabo but in 1935 she wrote that she'd been told of "some marvellous things in a mathematical school in Oxford - sculptural working out of mathematical equations - hidden away in a cupboard" which she intended to look at. So it is likely that Hepworth discovered the use of string independently.

- The Surrealists were also interested in the mathematical models and Man Ray (at the urging of Max Ernst) took photographs of the models at the scientific Poincaré Institute.

NOTES

- **Form of Knowledge: The Mathematical Model as Muse**
- Naum Gabo's *Construction* (1936) is based on an illustration of a mathematical model in the 14th edition of the Encyclopaedia Britannica.



“The lost wonder of Concorde: A marvel, an inspiration and a 23 miles-a-minute gentleman’s club” (Country Life, March 2019)

Wolfgang Tillman, *Concorde Grid*, 1997, Tate

- The Cold War started after World War II. It was a time of fear and uncertainty but mixed with hope for the future.
- In Britain there was hope that the technological developments that took place during the war would place Britain at the forefront particularly in aeronautics. British radar and Frank Whittle's jet engine were world leading developments and people flocked to air shows to see the latest developments.
- Britain produced the world's first jet airliner, the de Havilland Comet, the jet-powered Hawker Hunter fighter that broke the world's air speed record and the advanced bat-winged Avro Vulcan bomber. But the project that captured the public's imagination was Concorde.
- In 1956 a committee met to design a supersonic passenger jet liner. No research was done of the market requirement,

passenger needs or the economic justification but the pure engineering project went ahead anyway. In 1962 when France joined the project it was called Concorde.

- When the astronaut and first man on the moon, Neil Armstrong, came to Britain he described the Concorde project as "just as great a technical achievement as putting me on the moon". Concorde was an unbelievable plane. It was so fast that no fighter jet in the world, not even the most advanced American planes could keep up with it across the Atlantic.
- The world was changing and the euphoria at the air shows of the 1950s and 60s was replaced by concerns about the ear-shattering noise, the environmental impact and the cost.
- (CLICK) This artwork by Wolfgang Tillman is called *Concorde Grid* and it presents a grid of snapshots as if taken by a keen amateur recording Concorde passing by. (CLICK) This is a closeup of one of the photographs. Like many artists that use photography he wanted to step away from the commercial use of photography like the photograph on the left. He says his pictures 'are a representation of an unprivileged gaze or view ... I like to assume exactly the position that everybody can take'. It won the 2000 Turner Prize.
- Tillmans celebrates our desire for a utopian future when previously unimaginable technology becomes part of everyday life.

NOTES

- Section 3: The Age of Ambivalence 1940 to the Present
- Supersonic the Art of the Possible

- During and after the Second World War. New imaging techniques, computer modelling, post-war prosperity, new civil applications, uncertainty about the role of science, Cold War, the age of fear and dystopia
- 2000 the prize was won by Wolfgang Tillmans. Other entries included a large painting by Glenn Brown based very closely on a science fiction illustration published some years previously. Michael Raedecker and Tomoko Takahashi were also nominated.
- Tate online caption, 'Tillmans photographed Concorde from ground level, under the flight path or outside the airport perimeter fence. He says his pictures 'are a representation of an unprivileged gaze or view ... I like to assume exactly the position that everybody can take'. Rather than thinking of these machines as luxurious and inaccessible, Tillmans celebrates our desire for a utopian future when previously unimaginable technology becomes part of everyday life. Tillmans took the photographs before Concorde was retired in 2003 following the crash three years earlier in which all passengers and crew were killed. Knowing this perhaps changes the way we perceive the photographs.'
- One of the earliest photographers of the common view was the American photographer Stephen Shore (b. 1947) and his pioneering colour photographs taken on his trip across America and published as Uncommon Places (1982).
- "Tillmans photographed Concorde from ground level, under the flight path or outside the airport perimeter fence. Rather than thinking of these machines as luxurious and inaccessible, Tillmans celebrates our desire for a utopian future when previously unimaginable technology becomes part of everyday life. Tillmans took the photographs before Concorde

was retired in 2003 following the crash three years earlier in which all passengers and crew were killed. Knowing this perhaps changes the way we perceive the photographs." (Tate online caption)

BIO:TILLMANS

- **Wolfgang Tillmans** (born 1968) is a German fine-art photographer. Tillmans came to England from Germany in 1990 when he was 22 to study at Bournemouth and Poole College of Art and Design. He had already begun taking and exhibiting the kind of photographs for which he has become known – colour images with a snapshot aesthetic apparently recording ordinary moments in his and his friends' lives. Inspired by the rave culture of the late 1980s in which he was an enthusiastic participant, he took a camera to a Hamburg nightclub and sent the resulting photographs to i-D magazine, who printed a selection in May 1989. Throughout the early 1990s, i-D magazine commissioned spreads from Tillmans, whose pictures of young people and the clubbing scene quickly extended to subversive fashion shoots. With the collaboration of his subjects he began setting up scenarios which reflected his personal lifestyle and fantasies. His styles encompass portraiture, documentary, still-life, landscape and more recently, a unique form of abstraction created by manipulating light on photographic paper. He has said of his photographs that 'they are a representation of an unprivileged gaze or view ... In photography I like to assume exactly the unprivileged position, the position that everybody can take, that chooses to sit at an airplane window or chooses to climb a tower.'
- His diverse body of work is distinguished by observation of

his surroundings and an ongoing investigation of the photographic medium's foundations. Tillmans was the first photographer – and also the first non-British person – to be awarded the Turner Prize. He has also been awarded the Hasselblad Award, the Royal Photographic Society's Centenary Medal, the Royal Academy Summer Exhibition's Charles Wollaston Award, The Culture Prize of the German Society for Photography, and is a member of the Royal Academy of Arts. Tillmans lives in Berlin and London.

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- **The Festival of Britain was a national exhibition that took place across Britain in the summer of 1951. It was organised by the Labour government to give Britons a feeling of recovery in the aftermath of war and to promote the British contribution to science, technology, industrial design, architecture and the arts.**
- **The main site on London's South Bank featured the largest dome in the world at the time. It held themes of discovery such as the New World, the Polar regions, the Sea, the Sky and Outer Space. Next to the dome was the Skylon a futuristic structure that appeared to hang in space. The day before the opening a student climbed to the top and attached a college scarf.**
- **One of the most popular attractions was a 400-seat cinema with 3D films and large screen television. A few minutes boat ride down the Thames a fun fair was built in Battersea Park.**
- **The Festival was criticised from the beginning as a waste of money, too futuristic, too innovative and too gaudy. Luckily the public did not agree and it attracted more than 8 million paying visitors and made a profit.**

- **Winston Churchill regarded it as socialist propaganda and the new Conservative Government levelled the whole site except for the Royal Festival Hall which became the first post war Grade 1 listed building. If this had not been done the Skylon and the dome could well have defined a new, exciting, technological post-war Britain.**

NOTES

- **Patterns from Atoms: Designing the Future**
- The Festival of Britain was a national exhibition in Britain in the summer of 1951. It was organised by the government to give Britons a feeling of recovery in the aftermath of war and to promote the British contribution to science, technology, industrial design, architecture and the arts. Labour



Prototype Terylene nightdress, made by ICI, Manchester, 1948-1950

Prototype Terylene nightdress, made by ICI, Manchester, 1948-1950

The Man in the White Suit, a 1951 film starring Alec Guinness

- **The worlds first synthetic fibre was Nylon discovered in the 1930s. But during the Second World War two chemists discovered Britain's first synthetic fibre which was later marketed by ICI as Terylene.**
- **After the war these new hard-wearing, quick drying and crease-resistant materials revolutionised the clothing industry and Britain had the potential to become a world leader in new materials. We failed again to take advantage of this lead.**
- ***The Man In The White Suit* is a 1951 British satirical science fiction comedy film made by Ealing Studios starring Alec Guinness. It follows the adventures of a "common man" against the Establishment, the hero falls foul of both trade unions and the wealthy mill owners who attempt to suppress his invention.**

NOTES

- **Wonder Materials: Transforming Everyday Life**
- The Man In The White Suit is a 1951 British satirical science fiction comedy film made by Ealing Studios. It stars Alec Guinness, Joan Greenwood and Cecil Parker and was directed by Alexander Mackendrick. It followed a common Ealing Studios theme of the "common man" against the Establishment. In this instance the hero falls foul of both trade unions and the wealthy mill owners who attempt to suppress his invention
- Prototype Terylene nightdress, made by ICI, Manchester, 1948-1950.
- In 1941 chemists John Rex Whinfield and James Tennant Dickson discovered polyethylene terephthalate (PET), Britain's first synthetic fibre. PET was developed and commercialised by Imperial Chemical Industries. This nightdress is one of the first garments woven by ICI from Terylene. It dates from 1948-1950 and is a prototype developed by ICI and not a commercially available item. Clothes made from synthetic fibres were appealing, being hard-wearing, quick-drying and crease-resistant. At a time when clothes were still generally very expensive, Terylene quickly found public favour as an alternative to wool and cotton. The development of artificial fibres led to a massive change in the textiles industry globally and represents an attempt by the British Industry to diversify and remain competitive with other centres of manufacture. Once heralded as wonder materials, man-made textiles have left us with a damaging environmental legacy: polluted water supplies and widely dispersed microplastics.
- In *A Man in a White Suit* an altruistic chemist invents a fabric

which resists wear and stain as a boon to humanity, but big business and labour realise it must be suppressed for economic reasons.



David Hockney, *Pearblossom Highway #2*, 11th-18th April 1986, 9' × 6', J. Paul Getty Museum

- Photography has played a key role in all scientific disciplines but during the nineteenth century it was a hobby for the wealthy. Then, in 1900 Kodak released the Brownie camera which sold for (CLICK) 5 shillings (25p) in the UK. It required no dark room, as they said "You Press the Button, We Do the Rest".
- In the 1940s, Edwin Herbert Land, an American scientist and businessman founded the Polaroid Corporation. The Polaroid camera was released in 1948 and it provided a photograph within seconds. The camera was a success and had an impact on many artists although few made more use of it than David Hockney. (CLICK)
- In 1982 the curator of the Pompidou Centre in Paris saw Hockney and persuaded him to exhibit some of his 20,000 photographs. Hockney at that stage did not regard photography as a true artistic medium. He felt photography could show time only a

frozen moment from one point of view. Painting however took hours or days and he felt it was this investment of time that made a painting worth studying.

- The curator selected 100 photographs to exhibit but they could not find the negatives so he bought \$12,000 worth of Polaroid film. When he left Hockney was intrigued by the possibilities of Polaroid and he went round his house taking hundreds of photographs which he then knitted together to represent his house through space and time.
- **However, Hockney had by then taken over 20,000 photographs and he became obsessed with using his Polaroid and would wake up with new ideas in the middle of the night. He was thinking of time but realised one cannot perceive space without time. He believed that taking photographs while moving through space and therefore time one can create something closer to the way we see in real life. He compared that way he took multiple photographs from different perspectives with Cubism.**
- (CLICK) ***Pearblossom Highway #2*, 11th-18th April 1986 is one of his best known Polaroid collages compiled from over 7600 separate photographs. It shows a crossroads in a very wide open space. He had been spent three days on the road as a passenger being driven across America. The experience of being a passenger is very different from being a driver and that is shown here. On the right are the road signs the driver must pay attention to and on the left are the wide open spaces that the passenger can examine at leisure. The littered cans and bottles show the junction between the wild desert landscape and the pollution produced by careless travellers.**

NOTES

- **Polaroid Perceptions Capturing an Instant.**
- David Hockney, Edwin Land

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Cornelia Parker, *Cold Dark Matter*,
1991



Cornelia Parker, *Cold Dark Matter*, 1991. Inspired by the concept of cold, dark matter.

- This is perhaps Cornelia Parker's best known work.
- It started as an ordinary shed full of bric-a-brac such as old garden tools, a child's tricycle, books, a fire bucket and son on. Parker first displayed the shed in a gallery and then took it to a field at the Banbury Army School of Ammunition where the army blew it up for her. She then picked up all the pieces and meticulously suspended them as if in mid-flight. She was exploring cartoon deaths at the time such as things falling off cliffs, things being run over by a steam roller, things being blown up, shot full of bullets, like Roadrunner or Tom and Jerry.
- *"The garden shed came about because I was trying to find something universal and archetypal and that we all identified with and that was familiar to us. It's not the house but it's this kind of attic-y private place at the bottom of the garden which we put all our left-over stuff in. And so it seemed like a depository*

rather than the place that you live.

- *The point of suspending it is to rob it of its pathos. After it was blown up and all the objects were lying on the floor, all very distressed, they had a pathos and somehow putting it back in the air where they were a little while before, it sort of re-animates them.”* (Cornelia Parker)
- **The title of the work leads us to make connections between the work and the world of science and space. Parker said, ‘cold dark matter is the material within the universe that we cannot see and we cannot quantify. We know it exists but we can’t measure it. It’s immeasurable, unfathomable’.**
- **Parker has created an unusual collision between the small scale and everyday (the garden shed filled with familiar objects) and the vast scale of cosmic events. Cold Dark Matter can be seen as a domestic scale Big Bang.**
- **The work is also about violence: the violence that exists around us in the world but also violence as part of the creative process. Her use of a garden shed, which she considers a typical feature of British life, as a container for her objects, shows a fascination with social institutions.**

BIO:PARKER

Cornelia Parker (b. 1956) studied at Gloucestershire School of Art and Wolverhampton Polytechnic. MFA from Reading University. She was shortlisted for the Turner Prize in 1997 and was Artist in Residence at the Science Museum in 1998-99. She became a Royal Academician in 2010 and received three honorary doctorates in 2000, 2005 and 2008. She won Artist of the Year Apollo Award in 2016.

- *Mass (Colder Darker Matter)* (1997), Parker suspending the charred remains of a church that had been struck by lightning

in Texas.

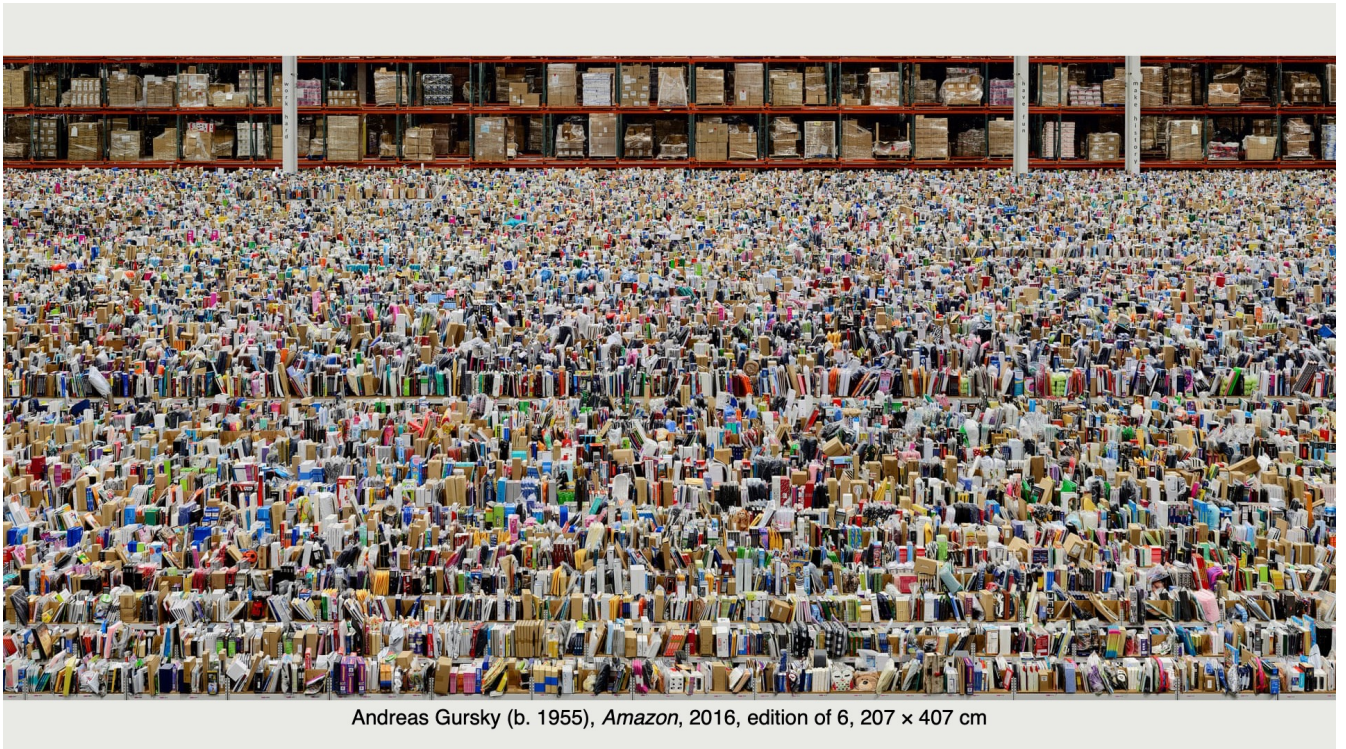
- She wrapped Rodin's *The Kiss* sculpture in Tate Britain with a mile of string (2003).
- In 2016 she was the first female artist to be commissioned by the Metropolitan Museum of Art (the Met) in New York to create a work for its roof garden. Transitional Object (PsychoBarn) is a scaled down replica of the house from the 1960 Hitchcock film Psycho.

NOTES

- Imagining Matter at the Edge of the Earth
- Cold dark matter was first proposed in 1982 as a solution to the problem that galaxies spin so fast they should fly apart. The 'cold' refers to the fact that the proposed particles travel slower than the speed of light while 'dark' indicates that it interacts very weakly with ordinary matter and electromagnetic radiation. If galaxies are prevented from flying apart by cold dark matter then it must make up about 85% of the matter in the universe.

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Andreas Gursky (b. 1955), *Amazon*, 2016, edition of 6, 207 × 407 cm

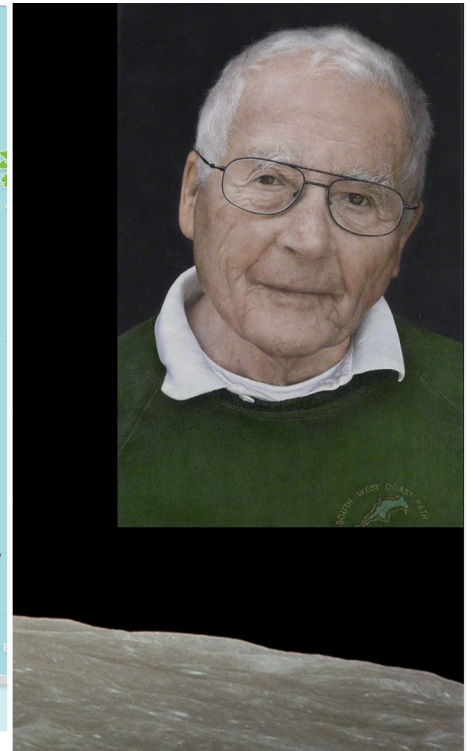
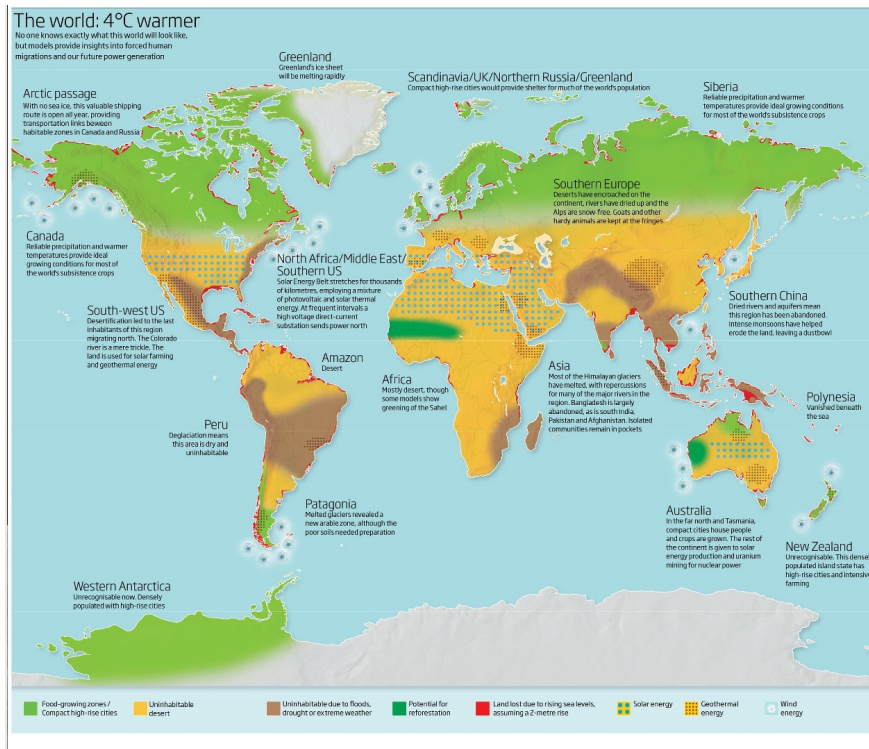
Andreas Gursky (b. 1955), *Amazon*, 2016, edition of 6, 207 × 407 cm

- I end with two images of the modern world, this one concerns the way the internet is changing the world.
- Andreas Gursky has taken huge photographs of events where the big picture is made up of an overwhelming mass of detail. He has photographed the stock exchange, container ports, raves, housing developments and Formula One.
- Gursky is a German photographer and professor in Düsseldorf. His enormous photographs achieve some of the highest prices among living photographers, one recently sold for over \$4 million.
- His pictures show things so vast and complex they appear to overwhelm the people who created them. He found it hard to get permission to enter an Amazon warehouse but insisted that his images were not “accusing” or a “political statement.” He said, “*Our world is also seduced by Amazon, because it’s so*

practical and so quick, and you want something and the next day you have it. This is also the truth ...I show our contemporary world the way it is."

NOTES

- **Patterns of thought: AI and Algorithms.**
- <https://www.theguardian.com/culture/2018/jan/26/andreas-gurskys-amazon-exposing-the-mindlessly-cruel-forces-of-global-capitalism>



Michael Gaskell (b. 2011), *James Lovelock*, BP awards 2013. James Lovelock (b. 1919) is an independent scientist, environmentalist, and futurist. He is best known for proposing the Gaia hypothesis, which postulates that the Earth functions as a self-regulating system.

Bill Anders (b. 1933), *Earthrise*, 1968. Taken by Apollo 8 crew member Bill Anders on December 24, 1968, at mission time 075:49:07 [8] (16:40 UTC), while in orbit around the Moon, showing the Earth rising for the third time above the lunar horizon. *The World: 4°C Warmer*, this is a map developed in partnership with the New Scientist. It shows the projected effect of a 4C global temperature rise

- And finally our world and what is to become of it.
- This is *Earthrise* by Bill Anders (b. 1933) taken in 1968 from Apollo 8 and showing the Earth rising above the moon's surface.
- This is James Lovelock (b. 1919, age 102 in 2021), an unusual

scientist, in fact an unusual person. At school he refused to do homework on the grounds that school had no claim on his evenings and weekends. He said later he learned most of his science from books he borrowed from Brixton Library. As he was good at drawing he parents took him to the National Gallery and V&A but he preferred to cross the road to the Science Museum.

- During the Second World War he worked for the National Institute for Medical Research. He worked on many things but his most important invention he at first described as a "fascinating distraction with no apparent use". It turned out to be an extremely sensitive device for detecting faint traces of chemical in the air. It was Lovelock's device that was important in detecting increasing levels of chloroflourocarbons (CFCs) in the air. At the time these were use in refrigerators and the leakage from old refrigerators destroyed the ozone layer at the poles and led to skin cancers in Australia. CFCs are now banned.
- His sensitive detector led to him being invited to work at NASA to work on the team trying to detect life on Mars, a project that still continues. Lovelocks realised that a way to detect life remotely is to look for gases that are quickly destroyed by chemical processes because if they existed it is likely they are being created by some form of life.
- **He worked for NASA in a team trying to detect life on Mars and this led to his most famous theory, the Gaia hypothesis. Essentially this says that the Earth is a self-regulating system that maintains favourable conditions for life. His ideas were controversial as they appeared to be pseudo-scientific but he developed a computer model that showed how life could respond to solar radiation and heat or cool the planet.**

- The notion of the Earth as a self-regulating system was captured by this image of *Earthrise*. The Gaia Hypothesis does not mean the Earth will heal itself. The Earth is not at risk from global warming it is humanity at risk. If we fail to control our emissions then much of the world will become uninhabitable but a few species, such as mosquitoes, jelly fish and cockroaches will thrive. (CLICK)
- I know the current target is 1.5°C but it looks increasingly unlikely it will be achieved. If we do nothing or even if we do only a little then the average global temperature could rise by 4°C by as early as 2060. The consequences are so terrifying that many scientists refuse to contemplate them but this map is taken from an article in *New Scientist* in 2009.
- 4°C might not sound, it is the difference between day and night temperatures but as an average across the world it will mean most of America, South America, Africa, the Middle East, India, China and Southern Europe are uninhabitable, all the yellow and brown areas. The Amazon rainforest has disappeared, rivers have dried up and little will grow in those areas. We will have to forget about countries as the world population of 9 billion by then will have to live in the temperate areas such as Canada, Northern Europe, Russia and Western Antarctica—the green areas where all the food must also be grown. There will be forest fire, floods, storms the like of which we have never seen and many low lying areas like the east coast of America and Polynesia will disappear under the sea, the red areas. Even worse most models predict that once we reach 4°C the juggernaut of warming will be unstoppable.
- (CLICK) I am sorry to end on such a depressing note but I am

pessimistic about China and America changing and they account for 43% of all the carbon dioxide produced. I am optimistic about the ability of science to pull a rabbit out of the hat but I fear we will run out of time first.

NOTES

- **Protecting the Earth: Political Pessimism on screen**

REFERENCES

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NEXT WEEK - HALF-TERM

3RD NOVEMBER: THE PRE-RAPHAELITE SISTERS