





One, or any mixture, of the constituents into which light can be separated in a spectrum or rainbow.

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- "It goes beyond physics. Colour goes beyond
- sight, it touches us. We feel colour, we
- breathe colour and in some cases, we can

taste it, or hear it."



THEORY



designmilk

Colour is one of the most powerful tools for visual communication.

Colour is an essential part of human-computer interaction, and similar to other elements like typography, designers should learn how to make use of colour with care.

COLOUR THEORY is a discipline that helps us make balanced and effective colour decision making.



OF EARTH **& FIRE**

The first colours to appear in any form of art, were black, red, white, brown, and yellow.

Most came from the

surrounding environment,

Chapter one the first colours but others held a much

higher value.







A STORY IN BLACK

jeremy bishop, photographer



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FOUR BOYS 6 ROBOT

One Thursday, in September 1940, in the South-West area of France, four boys and a dog named Robot made one of the biggest discoveries in the field of Prehistoric Art.

The boys went out on an adventure to explore the very woods they had grew by. That very Thursday they descended one of those deep tunnels, to find themselves surrounded by limestone walls, covered almost entirely by painted scenes of hoaxes and Caves.



- tunnels in the earth that were said to run beneath the
- bulls. This cave is today known as one of the Lascaux



COLOURS **OF THE** EARTH

Red. Yellow. White. Brown. Black.

These were colours of the first recorded art in the world.

Quite common colours, easily found in nature. Red and Yellow were rich when the earth was full of iron. White came from charcoal, Black from soot left by a fire and brown was the very colour of dirt.

If grounded into fine powder and mixed to animal fat or any binder, these colours could be fixed almost forever on the limestone walls of the caves.





THE BIRTH OF BLACK

What truly subverted expectations regarding the importance of colour, was the very composition of the black used in the paintings.

It was not soot, but rather a rare kind of manganese oxide called hausmannite. This particular compound was hardly existent in the area, and surely the humans of the time could not have artificially made it for it required a very heat centered process.





THE VALUE OF COLOUR

This manganese black was however easily found in the Pyrenees mountains, a good 150 miles away.

No one knows how that black

got to Lascaux, but many

historians hipotese that

already a good 17000 years

ago, colour had a value big

enough to be carried across

great distances.





SACRED RED

ian dooley, photographer



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WE, THE **ONLY** PEOPLE

The Tiwi Islands of the northern tip of Australia, have an aboriginal population of just a few thousands. For a long time that was the number of people the Tiwi Islanders thought of to populate the entire Earth. In their language, tiwi, means "we, the only people". Over the generations the Tiwi people have established a method to make sure their people would not conceive with those too strictly related to them.

When Tiwi children are young, they are assigned a colour: some children are red, representing the sun; or yellow, for the mullet fish; others are black, as stone; and the remainder are white, as the pandanus bush. Reds have to marry yellow or white, but cannot

marry other reds or blacks.

The Islanders use these four colours for many things,

one is to create astounding funeral poles, called

pukumani, meaning "taboo" or "dangerous".



tiwi artists, melville + bathurst islands



POWER ΙΝ COLOUR

However, the Tiwi people had a particular ochre red they were willing to travel for. This sacred red ochre came over 1000 miles away and would take two months for the people to make the round trip. If fruitful, the sacred red would be used for rituals.

This red was believed to be so dangerous only a few men could wear it and see it, while women were kept safe from it. Anthropologists suggest that the sacred red was regarded as sacred because of its chemical compound, making it shine.

This particular red was not solely used in Tiwi Islands, but had been found in Africa thousands years prior to the Tiwi People.









PERI LITHOS ABOUT **STONES**

The book is written in a casual manner, having historians believe it was just a set of notes written by one of his students. And this is how Peri Lithos, "about stones", became the earliest guide to what ancient Greeks knew about rocks and metals, including what happens when you set them on fire or smash them to pieces.

The first European book to mention pigments in any details was written in Athens in the fourth century BC, by philosopher Theophrastus.

In addition to the reds, browns and yellows found in the Lascaux caves, ancient Greece had metallic reds found in silver and gold mines, dangerous yellow made from arsenic and brilliant greens from worked copper.

And there was blue.

In fact, there were three kinds of blue available in



Greece; however the finest of them came from Egypt.



CHE-MISTRY

Resulting from a chemical process, and a very ancient one, about 19000 years before Theophrastus taught of about, this blue was made in a similar way to glass. Lime, sand and minerals that contained copper would do the trick.

The challenge lay in the quantity mix of the materials, not the stones themselves, and the temperature at which they had to cook. Said temperature had to be between 800°C and 900°C; if either too cold or hot, the result would be a rather unpleasant green.





COLOUR AND ITS WORTH

On the other hand, if they got it just right, the resulting blue stone would be ground into fine powder, to then be mixed to egg white, glue or acacia gum to make a paint so beautiful, it resembled the blue of swimming pools in summer.

This blue was so precious, the Phoenicians would give it to their business partners as a thank you gift.

It is perhaps the oldest synthetic pigment, as mentioned by colour historian Philip Ball, "a Bronze Age blue". The method got lost with ancient Rome, and only in the late 19th century scientist colour.



- rediscovered the method, as well as the beauty of the



YELLOW OCHRE

tiepolo apelles painting campaspe (c. 1725)





THE BASICS

A single one of his pictures would sell for

the price of an entire city.

Apelles was the favourite painter of Alexander the great.

Fun fact is – despite the

many colours already

available at the time -

Apelles is said to have used

only four, probably the same

four found in the Lascaux

caves and the same four the

Tiwi people used to organize

their daily lives: red, white,

black, and yellow.

PALE YELLOW

Story goes that as Apelles approached Protogenes, Greece leading artist, he couldn't find him at home. He asked an old lady if she could deliver to him a wooden panel, on which he had painted a very thin yet extremely straight line. As Protogenes arrived home, he found the panel on which the line had been drawn; recognizing Apelles hand, Protogenes drew a second line, thinner, and asked the same old lady to deliver it to Apelles, whom in return drew and even thinner and precise line between the already drawn two. Hence Protogenes admitted defeat, for no slimmer line could he draw. This painting was later acclaimed by the Romans, who held it as an account of unreachable precision. This is the very first minimalist painting ever recorded in history.

The red was an earth from the city of Sinope, now Turkey.

The white was imported from Greece. The artist himself invented a black made of burnt for obvious reasons). "pale yellow". Even the very best of it is a humble paint, although with it, Apelles apparently conjured up almost all the colours in the world.

- ivory from Africa (called "elephantinon" by the Greeks
- The word "ochre" originally comes from the Greek for

ROCKS MINERALS TWIGS & BUGS

With the value of colour and

pigment already

established, let us look at

how far humans would go,

to achieve power through

hues and tones.

Chapter two the price of pigment

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TYRIAN PURPLE

maria orlova photographer

PUR-PUREA

The most celebrated of all colours, was the resultant of macerated enzymes of a small shellfish, or rather millions of those. The colour was called purpura (from which we get the word purple), and it was a fashion phenomenon.

The Romans conquered the Egyptians in the second century BC, and then proceeded to copy plenty of their ideas, their art, and even their gods - and certainly their colours.

COLOUR FIT FOR AN EMPEROR

When Julius Caesar went to Egypt in 48 BC and met Cleopatra, he was nothing, if not fascinated and seduced by her and her magnificent lifestyle. The stone lining her palace, and purple sofas.

Purple became the colour of the emperor, feared by the people for it was too expensive, it would take more than 250000 shellfish to create 15 grams of pigment.

- latter included sails dyed with purple, purple porphyry

ΙΝΚ

No one knows when ink was invented, but by 4000 years ago ink was widely in use both i Egypt and China, as well as in various places in between. In China 1500 years ago, the best ink was made by burning oil lamps behind a bamboo screen: every half hour, workers would remove the soot from the lamp funnels using feathers.

BLACK & WHITE BEFORE IT BECAME COOL

In general, garments were made from silk, wool, or linen depending on your social status and what you could afford. Furthermore, there were laws that specified what kinds of clothing could be worn by whom. The color of the clothing also indicated rank. The Tang Dynasty (618-907) was the floreshing driver for Chinese art, where most artists would use black ink to define the artwork outlines and then use colour to fill in those areas. One man, Wu Daozi, inspired more by his heart than by standard techniques and flavors, decided to only use black ink to portray his creations. His paintings were thought to be amazing, so enticing people would see all of the colours in those black strokes.

From then on in China, monochrome or one-colour paintings were seen as more sophisticated as the coloured counterpart.

CLEAN THE AIR

Air lnk is marketed as a solution to air pollution and its negative effects on human life. Dubbed as "the first ink made out of recycled air pollution," its products were used in August 2016 in association with Tiger Beer to create street art and murals in Hong Kong's Sheung Wan district. 30–50 minutes of car pollution can supply enough carbon to fill one Air Ink pen.

Air lnk is a brand of ink and ink-based art products made by condensing soot-based gaseous effluents generated by industrial air pollution due to incomplete combustion of fossil fuels. Founded by produces its materials through a step-by-step process which primarily involves capturing of emissions, separation of carbon from the soot, and then mixing of this carbon with different types of oils and solutions. It uses a patented device called 'Kaalink' to carry out the filtration of soot, which metals and carcinogens.

- Graviky Labs, a spin-off group of MIT Media Lab, Air Ink
- contains carbon and other polluting agents like heavy

ULTRA-MARINE BLUE

jason martin space, light, time

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BY THE GRAM

You might look at a work of art and ask to yourself: "How did they make that?" or "I wonder from where the pigment comes from."

But do you ever look at a painting and go: "Now, that but must have been expensive!". That is how people in the Middle Ages and Renaissance would think when looking at art. An area of gold would give them the impression that a vast amount of money was involved in the commission of the painting. One of the reasons the church is one of the few institutions to have plenty of recorded paintings filled to brims with gold. There was one colour that would scream "Expensive!" louder than gold.

And that was Ultramarine Blue, made from lapis lazuli.

When thinking about the name ultramarine, one would think its origin comes from the sea, strange enough for its use is more often found when representing the skies.

BEYOND THE SEA

Although the term "marine" comes from the latin for sea, "ultra" means "beyond". Ultramarine refers to "beyond the sea", and the colour was named from where it came from.

For centuries all the ultramarine pigment in the world came from a single range of mountains in Afghanistan called Sar-i Sang, the "Valley of the Stone", thus making it so valuable.

It is astonishing to think that 6000 years ago the Egyptians would make the 3000 mile journey across some of the toughest terrains to retrieve this tone, to only use it as a jewel. Truth is, lapis is very hard to turn into pigment, for it is impure hence making it very difficult to retrieve only the blue pigment.

ТНЕ PRICE OF FAITH

It was only 3000 years later that the Afghans found a way to turn into dye, keeping this method a secret, hence weighing on the expensivenes and the exclusivity of the colour.

When later, the nobility decided to invest as patrons in artists, they also desired this particular and intense shade of blue. However, it was expensive, that they would first bargain on the quantity of its pigment used, before paying or commisioning the paintings.

When the secret arrived to Europe a few centuries later, it was a sensation. All churches wanted ultramarine in their paintings, it became the most prized colour pigment in Christendom. One may notice how the holiest of figures would "wear" this blue – women, especially the Virgin Mary, where in favour – as the pigment seemed so pure, only said subjects could represent its value.

THE PRETTY HISTORY OF P!NK

madonna pink corset

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STATE-ΜΕΝΤ

and the sea of "pussyhats" that swarmed the Women's March in Washington DC earlier this year. These iconic images all share a common thread: the color pink.

Pink has always been a spectacular contradiction. It's simultaneously fresh-faced and sophisticated, alien (a 17th-century Chinese word for pink meant "foreign colour"), internal (from our mouths to musculature), and at home in both high and low culture. In Japan, it serves as symbol of the slain samurai; in Korea, it's interpreted as a sign of trustworthiness.

next over the last three centuries. shade, which was a favorite of the pastel-loving European bourgeoisie.

- Elvis Presley's iconic 1955 Cadillac, Marilyn Monroe in
- a figure-hugging dress in "Gentlemen Prefer Blondes"

- In the West, pink has shifted from one extreme to the
- Eighteenth-century fashion helped to popularize the

NAMING

Pink rarely appears in nature, which may explain why the colour only entered the English language as a noun at the end of the 17th century.

It wasn't until the Renaissance that artists began to explicitly discuss pink as part of their palette. Italian painter Cennino Cennini described the shade as a blend between Venetian Red and St. John's White, figures and poised gentry alike.

But in other languages, the shade remains difficult to pin down. "In Japan, at least seven different terms are used for pink shades," says Bauhaus-Universität Weimar fine art professor Barbara Nemitz.

- using it to provide the glowing undertones of religious

ΙΝ THE COURT OF LOUIS XVI

It wasn't until the 1700s, however, that the color was popularized through the fashion and interior design worlds. Pastel pink was favored by both the men and women of the European bourgeoisie, from the Georgian gowns of Mary, Countess of Howe, to the embroidered silk coats sported by the well-heeled men of Louis XVI's court.

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Praised by proto-psychologists of the late 18th century, pink was recommended as the bedroom color of choice for the business-minded gentleman for a restorative and uplifting home base.

IN THE COURT OF LOUIS XVI

Pink was not then considered a "girls" color infants of both sexes were dressed in white, the most natural fabrics were not dyed yet. The tint was, in fact, often considered more appropriate for little boys because it was seen as a paler shade or red, which had "masculine", military undertones. In the West, pink first became fashionable in the mid-1700s, when European aristocrats wore faint, powdery variants as a symbol of luxury and class, mostly men to be precise.

Madame de Pompadour, the chief mistress of Louis XV, loved the colour so much that, in 1757, French porcelain manufacturer Sèvres named its exquisite new shade of pink, Rose Pompadour, after her.

POP GLAM LUXURY

Madonna performing in a Jean Paul Gaultier soft pink cone-cupped bustier in 1990, to rapper Cam'ron attending New York Fashion Week in a pink mink coat and matching hat in 2002.

Pink regained some of its former allure around the 1960s, when public figures such as Jackie Kennedy and Marilyn Monroe adopted it as mark of luxury. Punk bands like The Ramones and The Clash made it edgier in the 1980s, while in more recent decades, pop, celebrity and hip-hop cultures have embraced the color in different ways.

GREEN REBIRTH

green maze, seoul

DIFFICULT AND TRAN-SITIONAL

Chlorophyll is the photosynthetic pigment found in plants that allows them to have their fresh, calming hue. This rich colour has been all around us as a constant since the beginning of time (as far as we know), so it may seem strange to think of it as something with a past, but the verdant hue has a rich history filled with challenges. In fact, the colour green didn't come so naturally to those who tried to manufacture it as a pigment for paintings or decorating objects.

People have tried for centuries to make a truly green pigment.

In ancient Egypt, green was the symbol of mineral malachite to paint on tomb walls, however it was expensive and easily turned black over time. The ancient Romans came up with the solution to pigment that comes after weathering the metal. The ancient Romans used this pigment for mosaics, frescos, and stained glass. This early hue was also used by medieval monks to colour manuscripts.

- regeneration and rebirth. They tried using the copper
- soak copper plates in wine to create verdigris, a green

THE COLOUR OF WEALTH

In the Middle Ages, the colour of clothing indicated a person's social rank and profession. Red was worn by the nobility, while brown and gray was worn by peasants. Green was worn by merchants, bankers, and the gentry.

During this time, more green pigments were developed from natural materials, such as plants, but the colors always faded over time.

Early Renaissance painters such as Duccio di a more realistic hue. However, over the centuries the pink has faded, making some faces appear a sickly green.

- Buoninsegna discovered that if he painted faces with
- a green undercoat, then added pink, it gave the faces

TOXIC SUCCESS

In 1775, Swedish chemist Carl Wilhelm Scheele invented a deadly, bright green hue made with the toxic chemical, arsenite. Called Scheele's Green, it was so popular that by the end of the 19th century, it had replaced the earlier mineral and vegetable dyes-but its invention came with a price.

Historians believe the pigment caused the death of French emperor Napoleon Bonaparte in 1821, as his bedroom wallpaper featured the deadly hue.

Scheele's Green was used on paper, wall hangings, fabric, and even children's toys. Some 19th century journals contained reports of children becoming ill in bright green rooms, and ladies in green dresses becoming sick from consuming the toxic vapors.

THE CURSE

Some believe the pigment may have been responsible for Cézanne's diabetes and Monet's blindness. Paris Green was eventually banned in the 1960s.

By the end of the 19th century, a similar pigment called Paris Green replaced Scheele's Green. However, it was still highly toxic. This was the pigment used by French Impressionists such as Claude Monet, Paul Cézanne, and Pierre-Auguste Renoir to create their lush green landscapes.

RENEWAL BUT NOT

One of the most common shades today is called Pigment Green 7. Used in plastics and paper, it contains chlorine, which, when consumed, is known to lead to illness and even death. Another popular hue is Pigment Green 36, which also includes chlorine and potentially hazardous bromide atoms. Moreover, the popular bright Pigment Green 50 is a toxic cocktail of cobalt, titanium, nickel, and zinc oxide.

Today, green is a symbol of sustainability and eco friendliness. However, many versions of the colour green are still damaging to that very ethos. Despite all the modern advances in colour technology, producing green dyes and pigments is substances.

Despite its harmful chemical makeup, green is still associated with positive feelings such as vitality, freshness, calmness, and revival. In fact, Pantone revealed its Color of the Year as "Greenery" in 2017.

- still difficult and many hues continue to feature toxic

