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COLOUR

THE KNOWLEDGE OF THE INVISIBLE

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Fundación
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COLOUR.

THE KNOWLEDGE OF THE INVISIBLE

Colour is omnipresent, a concept that we take for granted, so evident that it does not seem to require greater reflection. It is one of the first things that children learn and it is commonly said that the sky is blue, that happiness is pink and that black augurs death.

Nevertheless, what if things weren't actually so simple?

For centuries, colour has attracted the attention of craftsmen, philosophers, artists and scientists. In recent times, these have been joined by the most advanced developments in the fields of artificial intelligence, neuroscience and psychology to the point where our machines are capable understanding what for us is intuitive. A complex problem, when in reality, we remain ignorant of more than we can say we know.



Paul Klee. *Bildnerische Gestaltungslehre: 1.2 Principielle Ordnung. Theory of pictorial configuration: 1.2 Principial Order.* 1922
Ink, watercolour and pencil on paper. Reproduction of the original drawing. Courtesy Zentrum Paul Klee, Bern

The exhibition *Colour. The knowledge of the invisible* explores this constant indefinability and contradiction. This journey begins, of course, at the foundational moment at which Isaac Newton

separated what he believed to be the seven colours within sunlight and demonstrated that the rainbow is merely a tiny part of the electromagnetic spectrum that so many scientists continue to use to such fascinating ends. Some of the protagonists of these cutting-edge projects us about them in first person. We will then go through some attempts at cataloging the complexity of which rests, as in the case of DNA, on a few elements.



Esteban Vicente. *Red Field*. 1972. Oil on canvas
©Archivo Fotográfico Museo Esteban de Arte Contemporáneo
Esteban Vicente, Segovia. Fotografía: Pototo Díez, Segovia

Despite Newton and the various colour theories that have been posited, the scientific ability to rationalise the mechanism of light has not resolved the problem. On the contrary, our experience of colour remains fluid, an unstable terrain that has attracted the creative minds throughout the ages. At the heart of the exhibition, we bring two specific colour scales into focus, blue and red, with their

tones of shifting meaning such as purple and violet, or those which stem directly from our industrial world, such as mauve. We explore them through the work of artists such as Yves Klein and Esteban Vicente, fashion designers like Balenciaga and Elio Bernhayer, the creations of popular culture and the anonymous craftsmen whose work makes up the Ana Roquero Collection.

The registration and reproduction of colour has been a driving force behind technological innovation. Since its invention, photography has sought to grasp the challenge posed by colour, as can be seen in the Martí Llorens collection and others and a not-so-widely known of the Nobel-prize winning neuroscientist Ramón y Cajal, who not only explored the way in which our brains perceive colour but also how to artificially register it. The dichotomy between neuroscience and technology was continued by Javier de Felipe and his Cajal Blue Brain project.



Colouring process of Telefónica's Historical Archive material
Simó-Serra Lab, University of Waseba (Japan)

The way in which technology has allowed us to visually represent each era determine the way in which we imagine them, as we can see in both film and television. From here stems the fascination that coloured black and white images awake in us. The technology developed at Japan's University of Waseda, which we offer a demonstration of, applying it to material from Telefónica's Historical Archive, shows how such techniques are altering the way in which we revisit our history.

However, the way in which we experience colour is closely linked to psychology, as shown in the work by an international team made up of scientists from the universities of Lausanne (Switzerland) and Autònoma de Barcelona (Spain). An immersive installation from the Onionlab studio offers visitors an experience in which they can explore their emotions evoked by various colours.



Roselena Ramistella, *The Warmth*, 2018-2021
Cortesía de la artista

The Italian artist Roselena Ramistella also explores the colour of emotions in her series *The Warmth*, in which she uses a thermal camera to get under the skin of vulnerable people who are fighting for survival and visibility. Through technology, their bodies offer an extensive palette which emerges when we least expect it and which, going beyond prejudice, forces us to reflect on what we believed we were aware of.

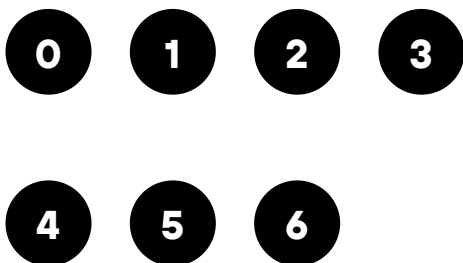
Our intention, when planning this exhibition, has been to open up more questions than to offer answers. Because, in the end, each of us has our own unique and non-transferable relationship with the colour that surrounds us.

María Santoyo and Miguel A. Delgado

Curators

**COLOUR.
THE KNOWLEDGE OF THE INVISIBLE**

EXHIBITION TEXTS



0 INTRODUCTION

Colour is a shared, positive and vital concept. Its appeal takes us back to a child's first conscious perceptions of rainbows, art and the beauty and diversity of our environment. By nature, colour is hybrid, transversal and therefore profoundly human. As a result, it has been the subject of study from various quarters, with sometimes contradictory conclusions: colour has proven to be a changing, constantly evolving physical, technological, cultural and psycho-social phenomenon. It is also an optical parameter, the paradoxically illusory effects of which define our cultural identities. Scientific, industrial and technological progress is increasingly extending our world's colour scale, allowing us an insight that goes beyond our own limits and the scope of how we see. In a certain way, colour has become the key to interpreting reality, while also giving us access to the very heart of things, gaining a real knowledge of the invisible.

1 FROM THE VISIBLE SPECTRUM TO THE INVISIBLE

At the beginning of the 18th century, the physicist and mathematician Isaac Newton placed a triangular glass prism in a beam of light coming in through the window, noticing how it was broken into a multicolour sequence that resembled a rainbow. This was one of the most important experiments in the history of science: the prism became the symbol of the scientific ability to understand matter, while the light passing through it symbolised, more than ever, enlightened knowledge that was capable of revealing truths hidden from the human eye. Since then, colour has been an invaluable parameter in scientific fields which are not usually associated with it, such as pharmacology, neuroscience, astrophysics and the development of artificial intelligence.

1.A Colour has been a constant companion to our scientific advances ever since Newton carried out his first spectrographic experiment. The breakdown of light has become a tool which has led to major progress being made in numerous fields, such as astrophysics and chemistry. Other colour applications are at the cutting edge of revolutionary technologies, including photo-pharmacology and artificial intelligence. These interviews with prestigious Spanish scientists illustrate just how far colour in science might take us.

2

COLOUR MAPPING

Classic colour theories have sought to establish organisational systems, while colour wheels that have been perfected since the days of Newton seek to establish and catalogue visible colour within ranges that are increasingly more diverse and accurate. Artists have used these colour charts to mix pigments and harmonise shades, establishing the traditional divisions between primary and secondary colours. Nevertheless, these ideas have lost absolute credibility and are no longer deemed to be valid for all colour science-related activities and their creative applications. Today, the representation of the colours of the spectrum has been greatly influenced by computer systems and artificial intelligence: we have discovered new colours that make it possible to describe a reality that is increasingly mediated by screens.

2.A François d'Aguilon's model

The first trichromatic representation of colour can be found in *Opticorum libri sex: philosophis iuxta ac mathematicis utilies*, published by the Belgian Jesuit mathematician and physicist François d'Aguilon in 1613. His study set out the thinking of medieval origin that defined yellow, red and blue as basic or "noble", the derived colours (orange, green and purple) and the relationship of all these with the extremes of black and white.



2.B Goethe's colour wheel

Johann Wolfgang von Goethe published his *Theory of Colours* in 1810, summarised in his colour wheel which he described as follows: "The chromatic circle is arranged in a general way according to the natural order, for the colours diametrically opposed to each other in this diagram are those which reciprocally evoke each other in the eye." For Newton, only spectral colours could be deemed to be fundamental. However, Goethe's more empirical, romantic approach recognised the essential role of magenta in a complete colour wheel that considered not only perception, but also the emotions that colours evoke.

2.C Colour theory – additive and subtractive colour synthesis

Additive synthesis consists of the combination of determined amounts of red, green and blue (RGB) light in order to create new colours. If we mix these three light sources at the same intensity, the eye will see the result as white.

The RGB model is used on computer monitors, televisions and video projectors.

In printing however, colours are created by mixing the three primaries, namely cyan, magenta and yellow (CMY). This method is known as subtractive synthesis, as the dyes filter the white colour landing on the printed surface, absorbing all the colours of the spectrum except the desired mixed tone.

2.D The Munsell system

In the system devised by Albert Munsell in 1915, tones are organised in a circular fashion, with five principal hues (red, yellow, green, blue and purple) spaced equidistantly, while the intermediate hues lay between these, the result of mixing their extremes. For each principal and intermediate hue, there is a scale from 1 to 10 which refers to the luminosity – the “value” – of the colour. The “chroma”, or saturation, describes the level of purity of a colour from the same hue and of the same value. On this scale, the chroma varies depending on the extent to which it approaches maximum purity or intensity of each dye, meaning that the maximum value does not remain static, but rather varies depending on the colour.

2.E James Clerk Maxwell's colour experiments

The Scottish physicist James Clerk Maxwell began to take an interest in the nature and perception of colour in the mid-19th century. Maxwell demonstrated that white light could be the result of a combination of red, green and blue light. His article *Experiments on Colour* examined the principles of colour combinations and was presented to the Edinburgh Royal Society in March 1855. Maxwell's work argued that any colour could be formed by the combination of three sources of differently coloured light which represent the basis of modern colourimetry.

2.F Küppers' colour cube

In 1978, Harald Küppers published an atlas that was specifically dedicated to graphic arts and the printing industry, which contained over 5,500 colour shades. According to Küppers, it is impossible to present a logical, systematic combination of all chromatic and achromatic (greys) shades on the same plane. In order to produce such a representation a three-dimensional "colour space" or "colour body" is needed, with a cube being the simplest, most didactic form.

2.G The CMYK Atlas

The CMYK (cyan, magenta, yellow and key) model is based on the subtractive system used in colour printing. This is the modern, more accurate version of the traditional colour model (RYB: red, yellow, blue), which is still used for paint and in the fine arts. It allows the representation of a wider range of colours and adapts better to industrial uses.

3

COLOUR AS INVENTION

Colour does not exist, it is not real. Light affects the visual organs and produces chromatic sensations that are not the same for everyone, although there is a global consensus on their naming. As an invention, colour contains many cultural, historical and social conventions that can be examined and questioned. If there is a particularly expressive range in this regard, it is that from blue to red, including very significant shades from a cultural point of view, such as pink and purple. These are colours permeated by ideas linked to religions, power, industrial development, popular culture and gender conventions. None of these have always meant the same thing, nor can we assume that their symbolism or perception is the same in all cultures.

3.A Ultramarine blue, produced from the highly-valued lapis lazuli that was brought from the Orient in caravans and which for centuries was the most expensive of all colours. For this reason its use was restricted to items such as the mantle of the Virgin Mary, an identification which in the 19th century was extended to all Marian representations. Prussian blue is a somewhat different case. It was originally produced from plant known as glastum or dyer's woad, which was established in the 17th century as the colour of the national uniform to protect Prussian artisans from the competition posed by oriental indigo. Until the First World War, it was one of the most widely-recognised military colours.



3.B In 1850, Levi Strauss invented blue jeans (a term that came from the French Bleu de Gênes), a hard-wearing garment for use by gold prospectors and cowboys. The cotton with which they were made, known as denim, was dyed with indigo, which by now was much cheaper, thus popularising the characteristic navy-blue colour of jeans. Finally, the appearance of industrial and artificial aniline and indanthrene dyes reduced the cost of colouring fabric blue to a minimum. From that moment on, the use of blues spread throughout society, to the point at which it became one of the distinctive signs of the working class's uniform.

3.C Blue is frequently associated with the sky and the sea, despite the fact that neither are always the same colour and the latter may not in fact be blue at all. The origin of this association is a combination of poetry, art and science. In 1789, the pioneering mountaineer Horace-Bénédict de Saussure realised that at height, the sky was a darker, more intense blue, a fact that he was able to demonstrate thanks to a simple device that he had invented, a wheel that was dyed with varying shades of Prussian blue, which he then compared with the naked eye in order to establish the tone. Prussian blue also characterised a photographic process invented in 1842 by the astronomer John Herschel. Cyanotypes consisted of paper that had been light sensitised with potassium ferricyanide and ferric ammonium citrate to produce a cyan-coloured negative image. The botanist Anna Atkins used this technique a year later to catalogue a number of different species of algae in the first book ever to be illustrated with photographic images.

3.D The iridescent mauve colour of this dress is obtained through a combination of blue and pink warp threads. In 1856, William Henry Perkin accidentally discovered mauveine, the first synthetic chemical colourant, which was patented as aniline purple. The new tone caused a furore when Queen Victoria attended the wedding of her daughter in a bright mauve dress, making the colour fashionable with the bourgeoisie and making it one of the characteristic sights of the Victorian era. However, perhaps the longest-lasting consequence of this mauve fever that Perkin had unleashed is that it represented the start of the chemical industry on a large scale, as the first major companies, Bayer, Ciba-Geigy and BASF were founded expressly in order to manufacture synthetic colourants.

3.E There have been truly memorable red dresses, such as the Givenchy creation for Audrey Hepburn in *Funny Face*, the gown that Julia Roberts wore to the opera in *Pretty Woman*, the dress that drove Roger Rabbit crazy and that worn by Queen Cersei Lannister in *Game of Thrones*. The evolution of women's roles can be analysed through the joint perspectives of cinema and fashion, which has also liberated the colour red from gender stereotypes.

3.F The First World War saw the emergence of mass propaganda posters. Nevertheless, it was after the Russian Revolution that more modern concepts of design took root, as can be seen in the work of the constructivist pioneers Rodchenko and Maiakovski. Shortages meant that they had to prioritise the use of limited range colours, and tones such as red were used by all ideologies. The influence of the Soviet aesthetic can be traced through the propaganda which came afterwards, especially that produced in the Second World War. This was also the case in the Spanish Civil War, with certain uses of colour that went beyond the conventions that identified the opposing sides in the conflict.

3.G Technical limitations were an enormous hindrance to the use of colour in the first decades of comics, which obliged artists to use a curtailed, yet nonetheless striking palette. You only have to look at how superheroes wore vibrant reds, blues and yellows compared to the duller colours of the villains they faced (with the notable exception of Batman, whose dark grey was a distinctive part of his identity, typical of a character who was always more ambiguous than the other superheroes). Improvements to printing consolidated the role of the colourist who, thanks to advances such as the introduction of computers, now had an unprecedented chance to play with colour, and, in many cases, re-examine the values that we associate with them.

3.H These days we wear a unparalleled variety of colours, with an access to them that has never been within the scope of so many people. However, the relationship with colour dates back to antiquity and appears in all cultures, as can be seen in the outstanding collection of the researcher into dyes throughout history, Ana Roquero, who has compiled a unique inventory of pieces and techniques which is an international benchmark. In this selection we can see how indigo, maroon, carmine and purple have not only been with us for many centuries, but also demonstrate the fertile intermixing of cultures that have exchanged knowledge for time immemorial, creating results of enormous beauty.

3.I Numerous pop icons have built their image from an adulterated use of colours and their typical cultural meanings. From the gentleness of pastel tones to the stridency of fuchsia or the modernity of ultraviolet, record covers have exploited colour to show us the intimacy of a partner, of androgynous princes, new masculinities within rock and hip-hop and women who exhibit their sexuality from a position of power. Nothing is random in the music industry, sustained as it is by image.

3.J Cristóbal Balenciaga worked with different shades of pink, from the very palest to neon pink and fuchsia. This dress, made from a rigid fabric known as ciberlina from the prestigious Maison Staron, is piece that speaks of volume and geometric pattern with an understated beauty inspired by the apparel of the 16th century images of the Virgin Mary.

3.K The importance of this tunic dress by Elio Berhanyer lies in its silk satin bearing a print by its designer, inspired by op-art. Its geometric forms, typical of a late 1960s aesthetic is dominated by circles of intense contrasting colours and the presence of magenta in a garment that is a melting pot of masculine and feminine symbols.



4

THE TECHNOLOGY OF COLOUR AND COLOUR IN TECHNOLOGY

New technologies have always sought increasingly sophisticated and accurate tools to reproduce reality for documentary or fictional purposes. With the advent of photography in 1839, this process accelerated: at last a means of fixing vision and time. Since then, visual media such as photography, film, video and digital and virtual imaging have provided us with ways of remembering, analysing and reinterpreting our visible environment, allowing us to appropriate what had once been fleeting and create new universes. Capturing colour has been a constant challenge in this evolution, with results getting increasingly closer to actual perception, reaching the supra-reality that the latest technologies applied to cinema and video games provide us with.

4.A *The Wizard of Oz* was the first film to use colour for narrative ends. The real life of Dorothy was represented in sepia-toned black and white while the country of her dreams was depicted in intensely vivid colours. Technicolor was a luxury for big-budget films such as westerns and musical. However, after the Second World War, the emergence of other processes such as Eastmancolor meant that colour became more accessible and art departments and film cameramen began to exploit its expressive qualities. In this selection, we focus on green, a shade which, according to the colour historian Michel Pastoureau, suggests ambivalence, superstition, cheating and gaming. It is an unnerving, dangerous colour, yet nonetheless one that evokes hope.



4.B The first public television in colour was transmitted from New York in 1951. Since then, sports fans have gradually been able to watch matches in which they can enjoy seeing their teams in their colours on the green of the field of play. The 1967 Wimbledon tennis tournament was the first European colour broadcast. The green of tennis courts and football pitches became increasingly less dull yellow until they reached the sharp, bright greens that we see on our screens today. According to Michel Pastoureau, green has been the colour related with gaming and chance in the west since the 12th century, in an evolution which brings together to the box lids of board games and decks of cards and the green grass of sports venues and the colour of a table tennis table.

4.C The reproduction of the spectrum visible by the human eye on televisions has been a challenge since the first colour broadcast in 1951. The CIE 1931 standard establishes the variety of tones that our eyes can detect in the RGB format, as well as those deemed to be "psychological colours" that are created by our brains. CRT, the first cathode ray technology, was only able to represent a small range, while those that are currently used – LCD, OLED and HCR – far surpass 90% in a dizzying race to reach the long-dreamed-of 100%, resulting in the fact that the number of reproducible colours are now in the millions.

4.D "We may ask ourselves if, now that the daguerreotype has achieved an admirable degradation of tones, we will be able to produce colours to substitute the canvases and the vast number of aquatint etchings currently being produced. This problem will be solved when we find a single substance that colour red rays red, yellow rays yellow, blue rays blue etcetera. Mr. Niepce has already written on such effects in which, in my opinion, the phenomenon of Newton's rings plays a certain part." François Arago, 1839

4.E The official history of photography began in 1839 with the presentation of the daguerreotype before the Paris Academy of Science. François Arago's speech seeking to nationalise his protégé Louis Daguerre's invention anticipated the possibility of reproducing colours.

In 1861, James Maxwell produced the first colour photograph, inspired by Thomas Young's tri-colour theories, in other words, exploiting the human eye's capacity to perceive the three primary colours of light – red, green and blue

4.F Between 1867 and 1869, the Frenchmen Charles Cros and Louis Ducos du Hauron simultaneously announced the fundamental theories of colour photography. Nevertheless, the world would have to wait until the 20th century to see these theories take the form of accessible processes. Until then, colour could only be manually applied with watercolours, oils, other paints and dyes on the surface of the original image.

4.G The year 1935 saw the premiere of the first film shot in Technicolor, a process invented by three engineers from the Massachusetts Institute of Technology (MIT) which was based on the same tri-colour process applied by Maxwell and which came to dominate mainstream cinema from the 1930s to the 1950s. However, despite what is commonly thought, colour could be seen on cinema screens much earlier. From 1896 onward, the year that followed the birth of cinema, some films were manually coloured frame by frame with up to four different colour using the pochoir technique, using masks. Films could also be coloured in toner baths, using pink, green and blue tones for narrative purposes. The colour-obsessed Spanish film pioneer, Segundo de Chomón, even created his own colouring method, which he christened Cinemacoloris.

4.H It is not widely known that the Nobel Prize winner Santiago Ramón y Cajal was much more than just a keen amateur photographer. In order to represent the nervous system with the greatest possible accuracy, he studied photographic mechanisms and processes – particularly stereoscopy and colour photography – to register his microscopic observations obtained using Golgi's histological procedure, which reveals complete neuronal in three dimensions. Ramón y Cajal advanced the application of photography in microscopic observations, assiduously producing photomicrographs from 1887 onward. As well as preparing his own plates by hand, he also published numerous essays and articles on photographic processes, creating his own polychromatic reticulum process in 1906, although he never patented it. In 1912, he published a monograph on this matter, *The Photography of Colours*, which is still worth reading today.

4.I "The garden of neurology holds out to the investigator captivating spectacles and incomparable artistic emotions. In it, my aesthetic instincts were at last fully satisfied like the entomologist in pursuit of brightly coloured butterflies, my attention was drawn to the flower garden of grey matter, which contained cells with delicate and elegant forms, las mysterious butterflies of the soul, the beating of whose wings may someday clarify the secret of mental life."
Santiago Ramón y Cajal, 1917.

4.J Autochrome was the first procedure that gave the general public access to colour photography thanks to the experiments of the Lumière brothers, which was introduced onto the market in 1907. An autochrome is a photograph that recreates colour by additive synthesis through a network of potato starches that had been dyed orange, violet and green.

In his presentation to the Paris Academy of Science, Louis Lumière described the new method that was "based on the use of colour particulates which are deposited on a single layer on a single sheet of glass that is then coated with a suitable varnish and a layer of sensitive emulsion. The back of the plate is then exposed to light, it is developed and the image then inverted, showing in the form of a transparency, the colours of the photographed original."

Autochrome was a great commercial success for over thirty years, despite the competition from other similar processes. Until 1938 hundreds of patents were registered, including Dufaycolor.

4.K From 1935 onward, the Lumiere's autochromes were replaced with new subtractive processes. The colours were no longer obtained through orange, violet and green grains but rather through the superimposing of three layers of gelatine containing yellow, magenta and cyan colourants. Kodak hired Loopold Mannes and Léopold Godowsky, two musicians with a keen interest in photography to produce the first such film – Kodachrome. A year later in 1936, Agfa launched Agfacolor Neu while in 1946, Ektachrome, another Kodak film, appeared, along with other European and Asian brands. Thanks to these brands, amateur photography was democratised to the point where it was possible to document everything that happened to an average family anywhere around the world – memories that would reside in photo albums until the arrival of digital photography in 1990.

4.L In 1948, Dennis Gabor laid the groundwork for holography, an advanced photographic technique which was the heir to Lippman's interferential method that allowed all the optical information of an object to be gathered onto a plate which would subsequently be used to reproduce a three-dimensional image. Despite the importance of the discovery, it made virtually no impact beyond the scientific community until 1971, when Gabor received the Nobel Prize in Physics. Holography represented a radical innovation in terms of the spectral use of colour which was exploited certain artistic circles with impressive results in the 1980s and 1990s.

5

ACHROMATIC COLOURS

Technology has, to a great extent, determined the collective memory associated with each period, to the point that we associate it with the tones that techniques allow at any given moment. For this reason, it continues to be unnerving to see coloured images that we associate with black-and-white times, as the characters that populate such photographs we feel that are far removed from us become people just like us, with the same dreams and longings, the same needs, the same questions. It is surprising to notice how, merely by applying a layer of colour, carefully developed by the most advanced technologies assisted by artificial intelligence, colouring can profoundly transform our awareness of a past that is no longer in the past, wiping out time and helping us to discover the keys to understanding the present and what awaits us in the future.

5.A The colouring and restoring of films still produces really striking results. However, the majority of these have a serious problem in common, namely the high cost involved. Nonetheless, techniques are appearing that make this process available to a far greater number of people. One of the most interesting processes was developed by Satoshi Iizuka and Edgar Simó-Serra at the University of Waseda in Japan, who worked on a vast archive of old films which they treated with the assistance of artificial intelligence. The system automatically chooses a random number of frames from a film as the basis for the colouring of the whole reel. Only in the retouching phase is there any human intervention to ensure that the final result is near-perfect, thus reducing the overall cost considerably.



6

THE EMOTIONALITY OF COLOUR

The psychology of colour analyses how we behave in the presence of different colours, identifying the emotions they arouse in us. Are they always the same? What do such connections reveal about our character or state of mind? With his colour theory, Goethe laid the foundations for an approach that was the opposite of Newton's – subjective, romantic, but no less truthful. Despite this being an elusive field, the study of the perception of colours is normal practice in disciplines such as art, design, architecture, fashion and advertising. Recent research seeks to determine the scientific evidence for these associations between tonalities, feelings and behaviour. Are our cultural heritage and the subconscious inherent to the human condition?

6.A The Warmth

Do emotions have colour?

The Warmth is a series of images and videos taken with a thermal camera that was used to register colour changes in the faces of women who had been rescued from human trafficking, young refugees and asylum seekers. Based on emotional stimuli, these images tell us of their lives and experiences.

"I was looking for a new narrative, trying to follow an unexplored path. I wondered whether or not it was possible to translate emotions into colours and therefor, if they could truly be seen.

In these sessions, I used a professional thermal camera. With it and by asking these people questions, I sought to delicately probe their intimacy in order to find out if emotions could be



frozen in time and if it would be possible to visually perceive them through body heat. This project sought to find a remnant of the elusive.

I began by selecting the specific questions that I would ask to stimulate the emotional reactions I was looking for. I subsequently analysed the variations that were detected in the subjects' body heat.

I had the chance to observe how the colour of their faces changed depending on the impact that my questions regarding their past and future had had on them. I also saw that I had a powerful tool that could be used to reveal the drama of their lives and show the subjects' real strength and their emotions."

The testimonies of each person thus studied can be downloaded using the QR scanner on a mobile device. We should warn visitors that some content might be disturbing.

6.B Goethe's resistance to Newton's theories resided in his rejection of what he considered an intromission of physics in the field of natural sciences. In Goethe's analysis, Newton had confused concept such as additive synthesis in the case of light (in which the sum total of colours produces white), compared to subtractive synthesis of pigments (which results in black), attributing morals and aesthetic values to various tones. However rejected and reviled Goethe's vision might now be, his theory of complementary colours is nonetheless still tremendously influential in the art world, as it is based on the subjectivity of our perception. Curiously, today the most advanced currents in neuroscience and psychology tell us that our experience of colour is largely a construction of our brains.

The exhibition *Colour. The knowledge of the invisible* is accompanied by free workshops for schools and families.

In addition, there is a programme of free guided tours for individuals and groups with prior reservation. You may consult and download the Practical Guide to complement the visit.

For more information, bookings and registration for the activities please visit our website.

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