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Light Darkness And Colours

By Unknown

However well we get to know the world, it will always contain a day and a night side. 'Yellow and orange hues bear the essence of light,' Goethe says, an immediate warmth seems to billow towards us. Blue and violet hues however, bear the essence of darkness; like the high blue sky and the distant blue mountains. A blue surface seems to recede from us. When we look at the world, we see colours. We are used to thinking that these colours have something to do with the light; all cats look the same in the dark, we say. If the light disappears, the colours disappear but if the darkness disappears the colours disappear too. Its the light and the darkness together that create colours and render the world recognisable. In physics, colours can be measured but colours possess other qualities and properties which cannot be measured, but which we sense immediately. When the sun rises in the east, we may have the good fortune to observe a very special phenomenon; for a moment, the orange red light of the sun plays directly upon the cliff and our shadows appear to be greenish blue. These shadows are actually grey. Our eyes form the greenish blue as a counter of the powerful orangish red light. The simpler setup helps to show what really happens. We illuminate a cone from the left at first with white light, then from the right with white light. There is now a grey shadow on each side of the cone. If we add a green filter to the left hand lamp the whole setup is bathed in green light, except for the part that is in the shade of the cone, This time, when we switch the light on the right, which is still white, our vision creates a magenta shade where there is room for it, namely, in the grey shadow. If we were to zoom in until we can't see the surroundings anymore [simulated] but only the shadow itself, it stops looking magenta and turns grey again. If we view the shadow in isolation it is grey; but when you see it in the context of which it is a part, our vision invokes a magenta shade. Magenta is green's complementary colour. The German poet and scientist Johann Wolfgang von Goethe noticed the coloured shadows, and decided to investigate. Goethe is most famous for his poetry, but he also spent forty years drawing up a theory of colours and apart from Faust, he regarded it as is most important work. The phenomenon of coloured shadows led Goethe to the view that colours are part of our vision and is therefore a sensory perception first and foremost. He studied the eye with great interest, and based his entire theory on man as an observer. About vision he said: 'It will always strive for totality and unity', as we see from the coloured shadows. If the cone is lit from the left by violet light we create the complementary colour yellow by ourselves. Cyan blue light creates the complementary colour red. When we are subjected to an outer uniform colour influence, we create balance and harmony by forming an inner complementary colour. Coloured shadows cannot be seen on their own; but only in the context in which they appear. They have no wavelength and therefore cannot be measured so according to the scientists they do not exist [i.e. 'non-spectral'] and are dubbed an

optical illusion, nevertheless, we see them. Goethe investigated colours wherever he saw them. He tried to chart their qualties and essence, when and under which conditions they arose, when we see them and how they affect us. He rendered the results of his work visible in this colour wheel. Here, he incorporated the general laws he discovered, for example, the complementary colours; the harmonic pairs of colours are situated opposite one another. The harmonic pairs are an expression of the intercourse between the seeing man and the coloured world. When the world shows us one colour we respond with it's other half. Colours help to tell us about the world around us. They tell us that one thing is different from another. We would never spot the tiny berries if they weren't blue. The colours help us to differentiate. They tell us about the seasons and the cycles of life. They show us laws governing the reality we inhabit. Goethe concluded that colours affected us body, mind, and soul. So his Weimar home was carefully composed. The yellow of the dining room walls creates warmth and pleasure. The green blue hue of his study inspires calm, and stimulates the mind. There are many different forms of colour: chemical colours in flowers and trees; physiological colours, like the coloured shadows; and prismatic colours which arise when light is refracted by a prism. Crystals and raindrops can refract the light into all the colours of the rainbow. In order to study the refraction of light, Isaac Newton, the British scientist, constructed a triangular prism, and in 1704, he presented his theory of refraction and colour. In his experiment, he shone a sunbeam through a prism, thus refracting its light. He called the colours that thus arose a spectrum. He concluded that the colours were components of white light. Goethe knew of Newton's theory. To test it, he borrowed a prism from a friend. [Privy Councillor Buettner in Jena] He looked at a white wall and thought he would see a spectrum. But all he saw was the white wall. But when he looked in the direction of the window, something happened. In the boundary between the glazing bars and the window panes, colours could be seen. Newton had concluded that the colours were contained by light alone, but to his amazement, Goethe now saw through the prism that colours only arose in the boundary between light and darkness. And he also saw more colours than those Newton had observed. But where there was nothing but white, there were no colours. Here are the colours Newton and Goethe saw. Here are the colours only Goethe saw. Newton didn't see these; it was as if he only included half of the colours. Goethe included both spectra in his colour wheel. In his experiment, Newton tried to isolate sunlight in a darkened room; and then from geometrical descriptions, he deduced his theory. Abstract observation and isolated experiments are the foundation stone of the natural sciences, which our modern and technological society is built upon. For the last two hundred years, the watchword of classical science has been objectivity. Goethe's view was that sensory perception was important because it links us to the world and gives us knowledge of it.

His investigations remained within the reality we can see and sense. He maintains the association between part and whole. To gain knowledge of the world he says, 'We must first dismantle it, but then we must reassemble it to return it to its true context'. When Goehte describes colours where he sees them, he obtains an insight into the world that is revealed through the colours. He emphasised that it was important to observe the phenomena of colour without pleasure or displeasure, without expectations or prejudice. If we see them as they really are, they open up and tell other stories. According to Newton, and the western cultural heritage, colours are solely a matter of light. So we have never concerned ourselves with darkness. The natural sciences call darkness the absence of light, But you can't observe a ray of light or a ray of darkness. That is not a ray, unless it is surrounded by darkness or light. In visual reality, light and darkness are equals. Therefore Goethe says, 'we cannot talk about light without talking about darkness too'. For example, if we look at these rays striking the mirror, we discover that light and darkness can both reflect. Science describes light as bundles of energy or electromagnetic waves. [quanta] But deep down we still don't know what light is. What we do know, is that we can only see it when it strikes something. Although the rays of the sun are everywhere in the darkness of space we only see them when they strike other planets. What we see here is Earth, not the light itself. Light is invisible and only becomes visible when it encounters matter such as the moon, the earth, a hand, or some countryside. Smoke is also matter. Particles that reflect light. The smoke is what allows us to see the light in this box. Just as we only see the light across the lake because it strikes the mist. Now we've covered the hole in the box with glass so the smoke cannot enter. The beam of light is still crossing the box but we can see it. In itself, light is invisible. We are used to talking about sunlight. The light we see is really luminescent matter namely, glowing particles. Liquid iron also gives off light. As does the incandescent filament of a lightbulb. All sources of light are luminescing matter. When daylight disappears, the darkness of night takes over. In the darkness we find peace and quiet. Darkness is one half of our lives. We see the darkness at night. We see darkness in the shadows. We see darkness when we gaze into empty space. You might say that darkness is space, space containing invisible light. We associate light with matter and darkness with space. When night falls, shrouding the countryside in darkness and light no longer plays on the cliff, the trees and the petals and rocks at the water's edge, the space of the universe takes over; the world becomes cold and distant. But when the lights from the first glow of dawn spills onto the cliff, and the tree tops once more turn green and distinct and the dark sky turns blue the world becomes textural and present. In hot abundant Tuscany, where the heat makes the soil steam, and the light strikes the mist in the air, the grapes, sunflowers and other plants, we are enfolded

into a textural presence. In the cold Norwegian fellscapes where the air is pure and clear, and plant growth sparse, space and remoteness dominate. We feel small in this vast outdoor space. We cannot perceive space without matter or matter without space. In our perception of reality, matter and space are inseparable. The same goes for light and darkness. Light and darkness form a fundamentally opposing pair. Goethe called it: 'the Light - Darkness polarity'. The atmosphere and experience of the park's own spaces, shifts according to the distribution of light and darkness. The contrast between light and darkness absorbed Goethe, both as a poet, and observer of nature. In the celestial phenomena, Goethe studied the encounter between light and darkness and the birth of colours. Part of the earth's atmosphere consists of dust and particles that Goethe called 'Turbid'. In the turbidsphere, light meets darkness and the colours are born. At sunrise and sunset, when the white light of the sun passes through the turbid atmosphere we may observe the marvelous site of the colours playing on sky and earth. To explain what happens, Goethe ordered pieces of glass to be mounted in the lid of the box. They are colourless, but translucent; and thus have the same effect as the ash and particles in the turbidsphere. When the lid is closed and we look down through the glass into the darkness of the box, the glass looks blue. When we open the box and look through the glass into the light, the glass turns yellow. The snake on Goethes' glass has the same turbid effect. When we see the snake with the light behind it, the snake looks yellow; but if we see the snake against the dark background, we see the snake as blue. It is the same phenomenon that gives colour to the sun at sunrise and sunset. We see the white sun as yellow and red, when we see it through turbid atmosphere. The denser the turbidsphere, the redder we see the sun. The yellows arise in an interaction between our vision, the turbid, and the sun. When we look at the sky, what we are actually gazing into is the darkness of outer space, but we see it as a blue sky, when the light from the sun passes through the turbidsphere, that's just in front of it. The particles of turbidsphere reflect the light. There is thus, light in front of the darkness. The thinner the turbidsphere, the darker blue we see the sky. The blues arise in the interaction of our eyesight, the darkness of outer space, and the illuminated turbid. The colours belong to our eye sight. When we look at the darkness through the illuminated turbid we see the blues. Blue is illuminated darkness. The blues are born out of the darkness with the help of light. When we look at the shining sun through the turbid, we see it as yellow and red. Yellow and red are dark and light. The yellows are born out of the light with the help of darkness. We see the polarity of light and darkness transform into the colour polarity of yellow and blue. Light forms the starting point for yellow, and darkness for blue. Yellow and blue form the basis of all the other colours in the colour wheel. So Goethe and positioned them across from one another in his circle. Yellow on the left.

Blue on the right. The two glass stairways are full of yellow and blue fluid. In the lowest steps the colour is yellow, but the more layers - that is, the denser the light yellow becomes, the redder it gets. The same applies to the blues. The cyan blue gets darker, and darker.. rising to violet the denser it gets. Goethe called this the 'colour steigerung', or intensification. Goethe shows in his Theory of Colour that the concept of intensification recurs in phenomena as different as molten iron, a flower, a feather, the sky - everywhere the same pattern, from yellow to red, and from cyan blue to violet. In the horizon at sunset we see the blues intensify towards the darkness of the sky, and the yellows intensify towards the setting sun. The blue steigerung goes from cyan blue to violet. We associate the yellows with the properties of light, we perceive them as warm and textual. We associate the blues with darkness, we perceive them as cold and spatial. The yellow flowers come towards us. The blue flowers recede into what is almost a blue abyss. We ascribe properties to the colours corresponding to the polarity of light and darkness, such as: hot and cold, proximity and distance, major and minor. And we use colours to describe things in our lives: golden eras, feeling blue. Although each one of us is unique, we perceive the same blue sky and golden sun, and fundamentally we react to them in the same way. We talk about looking on the bright side or casting a shadow on proceedings, or having a sunny or a gloomy disposition. We recognise in ourselves the polarity of darkness and light from the world about us. The phenomenon of the sky where we see most clearly how colours arise out of the encounter between light and darkness. We see both the colour intensification and polarity. That is why Goethe called it the 'primordial phenomenon'. In Goethe's scientific method then, the colours are described where we see them. He insists that we ourselves are part of the experiments. 'We cannot separate the seer from the scene' he says. But just what is seeing? A white triangle against a black background is a very simple picture. If we remove the light in the form of the white triangle, we no longer see a picture at all, just darkness. A black triangle against a white background is another very simple picture. If we remove the black triangle we don't see a picture anymore either, just light. A picture comes into being in the encounter of light and darkness. Here the picture is the white wall, and the dark, shadows. As we can distinguish lightness from darkness we experience that we are seeing what we call a picture. Here, the picture consists of the white petals, the violet androecium with its orange heads. The world comes to us in the shape of pictures, and through them we recognise the world. From infancy, we gaze out into the world and build up our ability to distinguish our experience and knowledge of that world. We find our bearings within it, and recognise it through what we see. The knowledge and experience we have built up of the world by observing it comprises yet another picture; namely, the picture of our memories, or the picture of our consciousness. We always

carry our knowledge and experience around with us, when we look at the world, an encounter takes place between what we see, and what we know. The image of the world, and the image in our consciousness are inseparable, like light and darkness. Goethe's investigations took place in the world of pictures, because he described what he saw. That is why his prism experiments differ markedly from Newton's. Newton theorised about an isolated ray of light; but there is no such thing in visual reality. We can see as much by looking more closely at the first part of the classical experiment. The sunlight passes through a small hole and strikes the opposite wall. The result is what we call an optical image: a picture of the sun. It is a principle called 'camera obscura' (i.e. dark chamber) and known in Europe since the middle ages. When the light from the sun passes through the hole, an image of the sun is formed. What we see is not an image of the hole. The sun contains it's own image. No matter how small the hole, and no matter what shape it is, a round image of the entire sun will always be formed, surrounded by the darkness of space. It is not an isolated ray of light. The bulb in the camera obscura emits light into the room. Some of it is escapes through the tiny home in the wall and strikes the screen. Not only is the image of the bulbs depicted through the little hole, but the darkness around them too. That is why we see the picture of the arrow. The light always carries a picture of its own source. Here, the source is the entire radiant image of the tree, the yellow field, and the blue sky. Newton knew that the shining dot on the screen was a picture of the sun. But when he tried to investigate why colours arose when the sun's image was refracted by the prism, he left visible reality and the image of the coloured sun. He did so in order to seek a proof of why colours arose based upon the contemporary perception that everything in the universe consisted of tiny invisible building blocks or atoms. He was looking for the atoms of the colours. Newton imagined that light could be split up so that just one isolated ray passed through the prism. He defined his theory of colours using an objective yardstick, just as science today strives for objectivity, and defines the colours in terms of different wavelengths. Science can explain colours without observing them. The natural sciences show no interest in darkness; it is merely the absence of light. But it is our ability to see and interpret pictures that links us to the world we live in. Pictures that arise in the encounter of light and darkness. Newton presented a theoretical interpretation of the prism experiment, but Goethe chose to examine what he actually saw. He began to explore the image of the colour spectrum. He replaced a white square against a black background for the round sun. When the image was projected through the prism, he saw two colour spectra. A yellow red one above and a cyan blue violet one below. He observed that it was in the horizontal boundaries between light and darkness that colours were born. He called the two spectra 'boundary colours'. The boundary colours may also be seen in the sky where day meets

night. But the green from the Newton spectrum is not present. We send a white square against a black ground through a special prism. This prism can open and close. This enables us to observe the birth of the colours as a dynamic process as the image is refracted. When the prism is closed, the image passes straight through - just like a window. When the prism opens the image is refracted and shifted upwards. We now observe the way the boundary colours arise as the prism opens.. Yellow red below, blue violet above. The yellow and blue marginal spectrum arises, culminates.. and disappears.. as the image is shifted. If we substitute a bar for the square, reducing the distance between light and dark, something else happens. As the image shifts, the two boundary colours arise as they did earlier, but because the gap between them is smaller, they meet, and yellow and blue mix.. The colour green appears. We observe that Newton's spectrum only arises as a particular phase of Goethe's two boundary colours - when they are close together. It is the distribution of light and darkness in the image that determines whether Newton's spectrum arises. Newton concentrated on a theoretical definition of the colours. Goethe explored them as dynamic processes. Everywhere, in prisms, in celestial phenomena, in nature, he observed and recognised the birth culmination death and rebirth of the colours. He sought general laws. One of them was that colours arise where light and darkness meet. If we look at the black tree against the white background through the prism, we recognise the Newton spectrum with it's bright blue green and red. But where the black branches are very thin, we also discern other colours, namely pale yellow, magenta and cyan. The image that produces Newton's spectrum is a white bar against a black background. In the black bar on the right, the boundary colours switch over, so that red and violet meet and merge into magenta; the way yellow and blue merge to form green. Here is the dark spectrum that Newton found, together with the light spectrum that Goethe added. The light spectrum, and the three light colours. The dark spectrum, and the three dark colours. Goethe incorporated both the light and the dark spectra into his colour wheel. In the colour wheel, we recognise all the general laws that colours abide by, everywhere in nature; the nature we are a part of. Because recognition is harmony, Goethe calls his colour wheel the 'harmonic colour wheel'. Green forms the base of Goethe's colour wheel. It arises as a blend of the two primary colours, yellow and blue. The polarity is suspended and balance and calm emerge. The colour green belongs to the earth. Everything, yellow and blue flowers alike, start from a green sprout. Just like every other plant on earth. We may talk of the earth's green cradle. Magenta forms the top of the colour wheel. It arises as the culmination of the encounter between red and violet. Here too the polarity is suspended resulting in a sense of sublime peace. 'Clear light is everywhere', Goethe said. 'It hastens through space and only becomes visible when it is breaked, when it meets resistance'. Light and darkness

are engaged in a never ending struggle, sometimes light wins; sometimes darkness. Even in a pansy we recognise light and darkness. Colours are born out of light and darkness; they always have been, and always will. We are part of the world of colours and through them we gain knowledge of the world and of ourselves. Goethe's Theory of Colours