SUMMARY

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LIGHT

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Summary of “Light” by Bruce Watson

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Learn about the history of light.

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Introduction

Do you remember the first time you thought about light? As a baby, you probably found it comforting because it was the absence of darkness. As a child, you heard people say things like, “Oh good, it’s a sunny day!” and you learned to associate sunshine with happiness. Many kids also find light more comforting because we’re scared of what we can’t see in the dark. Popular culture also reinforces the message that light is desirable and safe. Movies, comic books, and video games teach us about the forces of good and evil by showing us that they are represented by the contrasts of darkness and light. Similarly, we see heroic figures like Jesus, superheroes, and angels represented by a halo of light that tells us they have come to save the day. But what is light really? How does it work? What role does it really play in our world? Over the course of this summary, we’ll explore the answers to these questions and more.

The History of Light

I hate power outages. We've all lived through them-- those moments when some form of natural disaster knocks out our electricity and running water and leaves us in the dark. And although some people may find it cozy, I've always found it horrifying to know that, for an indefinite period of time, I will be stranded in the dark. No matter how many times I flip the light switch, the light will not come on until the power has been restored. No matter how many candles I surround myself with, it will never be the same as watching an entire room become fully illuminated with a flick of a switch. And because I am so dependent on light, I feel lost whenever I can't have it, even if it's only for a brief period of time. I imagine many other people feel the same way. Because whether we realize it or not, we are so used to having access to light that we sometimes take it for granted. We can imagine, in an off-handed sort of way, what it must have been like in the Dark Ages, but we view it as being a time so far removed from us that it is almost beyond comprehension.

But for the purposes of this chapter, I want you to imagine-- really imagine-- what it would be like to be without electricity. Imagine you've never even heard of it. What would that be like? For starters, your life would literally be ruled by the rising and setting of the sun. While you have daylight, you can read. You can work. You can pursue your hobbies. And once the sun has gone to bed for the night, you have little choice but to do the same. There's only so much you can do by candle-light, after all. And if your life were controlled by the inexplicable rising and setting of the sun, it's easy to understand why you might attribute it to the control of a higher power. With no knowledge of science, the weather, or quantum theory, you would have little choice but to assume that the sun-- and, along with it, all other natural phenomena-- are controlled by God.

This is the perspective that governed the lives and logic of our ancestors until the nineteenth century. It is therefore unsurprising that people embraced what we now consider to be outdated and primitive beliefs. Devoid of any other explanation, it's no wonder that early man worshipped light and

attributed its existence to the act of a benevolent deity. It's no wonder that all creation myths-- ranging from Christian theology to ancient Egypt to Aztec lore-- position light as a glorious gift from God. (Fun fact: did you know that there are more than 100 Bible verses about light? There are also more than 90 creation myths about light from a host of different cultures! And of course, we've all heard the famous scripture verses such as "Let there be light!" and "I am the light of the world!") Because light was such a complete mystery, most people felt that an act of God was the only viable explanation. But because there are always a few inquiring minds in every population, we will always have scientists, philosophers, and thinkers who will push the envelope and challenge the conventional assumption. Researcher Jane Brox observes that there were also those who attempted to harness the power of light for themselves.

First, there were the cavemen who discovered fire, embracing its life-giving powers of warmth and visibility. In the tropics, people would catch fireflies and make a sort of firefly lantern to provide a form of artificial light at night. And in primitive Scotland, there was this bird called the storm petrel. Brox describes this bird as "a very oily seabird, which they'd catch and dry and thread a wick down its throat and then light it. And then that was a lamp." Brox's research has also proven that in ancient Babylon, you could pay for enough candles to illuminate an entire room at night, but it was incredibly expensive and you didn't get a lot of value for your money. By Brox's calculations, a day laborer's entire salary for one day could afford him about 10 minutes of light. But even though people were obsessed with light and desperate to acquire it, no one really knew what it was. It was, of course, the early scientists who first posited that light might not be a mysterious force distributed by the whim of a deity. Maybe it was something that could be studied, examined, and reproduced. And thanks to inquiring minds who asked questions as early as the 5th century, we developed the study of light.

Light as a Source of Inspiration

Because light has an endless ability to capture the imagination, it's hardly surprising that it touched the minds of artists and scientists alike. So, while early scientists were trying to figure out what light is and how to study it, artists were attempting to represent light in their paintings, drawings, music, and poetry. The history of religious associations with light meant that light was primarily depicted as holy. This was true of artistic representations across multiple religions. In fact, Christianity, Islam, and many tribal religions all depict light as being holy in their art! And this was never more apparent than during the Renaissance. The Renaissance initiated a holistic shift in art, culture, music, and thought, and light was at the heart of this transition. Painters began experimenting with the contrast of light and dark space in their works. Religious paintings characterized saints by a glow of pure light. And it was also during this time that light garnered many of the associations we see today in popular culture, such as purity, innocence, virginity, and hope.

The Renaissance also paved the way for an era known as the "age of Enlightenment," and there are a number of reasons for that. But you've probably already guessed the main reason: it was called the age of Enlightenment because people were so interested in light! However, this reference to light is both literal and metaphorical. Although people were indeed fascinated by the mechanics of illumination, they were also interested in the intellectual enlightenment that comes from the pursuit of knowledge. Where ignorance is represented by darkness, light embodied the freedom of new knowledge and discovery. And during this time, people across the globe were fascinated by the unlimited potential of discovery. Art, science, and the humanities flowed seamlessly together, with each discipline profiting from the other's newfound insights. The study of light was a crucial focal point of study during this time as well and this interest ushered in the scientific resolution. Historian Darrin McMahon observes that Enlightenment and illumination are inseparable; without the study of light, the insights achieved during the Enlightenment would have been impossible.

For example, he remarks that "a surprising number of Enlightenment figures were themselves directly interested in lighting and illumination. Benjamin Franklin, the son of a tallow chandler, took a keen interest in lantern design and helped to organize the public lighting of the city of Philadelphia. Lavoisier penned a treatise on the best means to light a great city like Paris, and experimented constantly with fuels, wicks, and the angles of reflection and refraction in the light emitted from lanterns. Voltaire, too, like Marat and Madame Du Châtelet, experimented with flames. Diderot wrote about the history of candles. Jefferson studied whale oil, among the 18th-century's most important lighting fuels. Goethe not only studied optics, but also concerned himself with the intricacies of stage lighting.

Just as importantly, a host of lesser lights pursued Enlightenment through illumination. Some, like the inventor and engineer Bourgeois de Chateaublanc, devoted their energy to technical matters, like perfecting the new reflector lamps, the réverbères. Others, such as Jean-Francois Dreux du Radier and his 'society of men of letters', wrote satirical histories of lanterns, mocking the pretensions of a new genre, the comparative history of light. Still others, like Pierre Tourtille-Sangrain or Charles de Rabiqueau, pursued the business of illumination as the counterpart to the business of Enlightenment. As the latter declared on his calling card, advertising his services as an entrepreneur de l'illumination, Rabiqueau could 'enlighten the mind as well as matter."

And last but "perhaps most importantly, public lighting created the conditions for a vastly expanded urban sociability that was central to the emergence of the public sphere. Shops stayed open longer, theatre curtain times were pushed back, and restaurants and cafés served long after dark, later than ever before. Salons and visiting hours were also extended into the night, meaning that enlightened discussion was very often conducted after the sun went down. Street lighting led the way, creating the appearance (if not always the reality) of greater safety and rational control over the environment, combatting not just crime but superstition and fear." Although we so frequently take it for granted, light is responsible for every one of the

modern freedoms we enjoy! And none of them would be possible without the early studies that were conducted on the properties and functions of light.

The Evolution of Light

However, despite these years of study, humans still didn't have light figured out. The Renaissance and the Enlightenment had driven the seventeenth and eighteenth centuries, furthering our understanding of science, art, poetry, music, and illumination. But artificial light had not yet been commoditized and there was much more to discover. In fact, by the nineteenth century, no one could really tell you what exactly light was. At the end of the day, you were still back at the drawing board: light was primarily defined as a source of inspiration and a gift from God. But no one was quite able to examine it in a laboratory or identify its scientific principles. Fortunately, however, this didn't stop the discovery and production of artificial light. Just as primitive people used fireflies in a jar to create light, nineteenth century inventors were also trying to harness the power of artificial light.

And as we all know, it was this quest for illumination that lead Thomas Edison to invent the lightbulb. The lighting supercenter Bulbs has conducted their own research into the history and evolution of the lightbulb and provided an accessible explanation which charts the history of Edison's discovery: "in 1878, Thomas Edison began serious research into developing a practical incandescent lamp and on October 14, 1878, Edison filed his first patent application for "Improvement In Electric Lights". However, he continued to test several types of material for metal filaments to improve upon his original design and by Nov 4, 1879, he filed another U.S. patent for an electric lamp using "a carbon filament or strip coiled and connected ... to platina contact wires."

Although the patent described several ways of creating the carbon filament including using "cotton and linen thread, wood splints, papers coiled in various ways," it was not until several months after the patent was granted that Edison and his team discovered that a carbonized bamboo filament could last over 1200 hours.This discovery marked the beginning of commercially manufactured light bulbs and in 1880, Thomas Edison's company, Edison Electric Light Company began marketing its new product."

The invention of the commercial light bulb truly revolutionized the world. But even though people had gained in-home access to artificial illumination, the study of light was still lagging far behind. Although inventors like Edison had figured out how to create light, people were still uncertain of its physical and scientific properties. And in fact, the study of light saw little progression until the turn of the century, when Albert Einstein transformed the scientific world with his discoveries. Although we primarily remember Einstein for his intellect or his famous formulas, you might not remember that he was the first to truly analyze light! Einstein discovered that light is made out of both particles and waves. He was also the first to study and calculate the speed of light. And his theory about the speed of light influenced his conceptualizations about space and time! In fact, the theories of time and space that we rely on today were first discovered by Einstein in 1905! Thanks to Einstein's brilliance, we know that the speed of light is constant and that time changes in relation to the speed of light. Therefore, light is constant and time is relative.

Final Summary

From the beginning of human existence, light has been a constant source of inspiration, wonder, and power for human beings. Today, however, we often take it for granted. Because we have access to light at the flip of a switch, few people know about the long and complex history of light and the discoveries it has inspired. But in fact, light has influenced art, poetry, music, science, and technology. And the invention of commercial light bulbs have enabled us to enjoy the modern freedoms we take for granted today.