

# On Perception and Light

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**Abstract:** In this paper I argue that interest in and use of ‘light’ was, and is, an ongoing area in the history of the philosophy of visual perception. I will argue that ‘light’ is not a real entity – that it does not exist in the real world, and that light waves are opaque. It should follow that the philosophy of direct perception of real objects is not sound.<sup>1</sup>

**Key words:** perception, direct perception, pre-Socratics, light,

The history of the philosophy of visual perception is very long. Such is its importance in perception, that papers usually use it as their main subject, rather than one or more of the other four sensory modes. Paralleling interest in perception, is a slower, but growing interest in light: what is it; does it have direct, causal effects on visual perceivers and what is its role in the physical world? It can be argued that a concept of light has become central to man’s understanding of the physical world. A standard argument might be: if empirically-oriented creatures are completely dependent on their senses for ‘knowledge’ of the real world, then there is no visually-based knowledge without light. Further, and irrespective of how it is described, no understanding of physical objects is possible without intermediaries that fill ambient space around objects. Although light itself is a peripheral subject of study in philosophy, its status in visual perception is often given too little attention.

The standard understanding is that light rays, as emitted by the Sun, are all-encompassing, and a subject of study of the physical sciences. However, if an understanding of the real world is predicated mainly on empirical knowledge, and rays of light are a primary source of data on the world — is fundamental in ordering the relation between perceiver and object — then arguments are incomplete without an understanding of light and its role in visual perception. An overview of light in the history of philosophy should lay some of the groundwork for the conclusions that follow.

It is likely that the word ‘light’ was used by Aristotle, and his immediate predecessors and successors, because it helped to explain what could not, at that time, be explained in any other way. For the Ancients, ‘light’—also known as fire, one of the four elements; Air, Earth, Fire and Water—explained many things, such as what the Sun does on ‘rising’ each morning; emitting light to destroy the darkness of the night. It should follow that the concept of ‘light’ became a central part of explanations on visual perception, on how visual perceivers ‘know’ of real-world particulars—of objects and of ‘colours’. Indeed, today, philosophy, physics and psychology writers use the term ‘light’, and point to its importance in having an understanding of the physical world, and the position of man relative to it. In effect, ‘light’ has become a simple way to explain relations in the world.

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<sup>1</sup> I use ‘veridical’ on the understanding that it refers to the truth of real particulars only.

The history<sup>2</sup> of perception shows that the pre-Socratic, Empedocles (Akragas, 490–430 BC) ‘thought that we see by emitting streams of light from our eyes’<sup>3</sup>. Emission theory (also known as Extramission theory), held that fire—thought of as composed of a mixture of the four elements—was its source. The argument was that light emitted by the eye illuminates objects looked at, so enabling the perceiving of them, or of reflections on the eye itself. Essentially, Empedocles thought of the eye as functioning in a way similar to many modern, mechanical devices: such as the electric bulb and the torch. Thought was turning inward, from explaining the essence of physical objects (under Thales and his successors), to explaining how objects are perceived.

If thinking was turning inward, then Alcmaeon (Croton, c.500–? BC), known to have dissected the eye and the brain, is thought to have traced the optic nerve from the eye.<sup>4</sup> He deduced that the brain rules the body. More relevant, Alcmaeon argued that the senses play a major role in perception, and that intromission theory—that superficial, sensory perception has origins outside of the perceiver—is correct. It follows that, if the superficial senses are connected to the physical brain, and visual perception happens inside the latter, then perception is related to what happens in the senses and the brain.

Although Plato (Athens, 429-347 BC) had an interest in both emission and extramission theories his pupil, Aristotle (Stagira, 384—322 BC), argued that: ‘Whatever is visible is colour and colour is what lies upon what is ... it is only in light that the colour of a thing is seen’<sup>5</sup>. Aristotle’s interest lay in the natural world, and believed that what is seen exists in the world. His argument that ‘colour is ... only in light’ seems to say that colour itself is ‘out there’ in light, a disturbance in air that fills the ambient space between eye and particulars looked at. Aristotle seems to argue that perception happens because the eye sees colour while the perceiver is looking toward real entities; the what is. The suggestion is that perceivers look out, into light, to colour—a property of the what is—that is on the what is; a physical object.

Intromission theory, moving thinking out to the ambient context, was taken up and expanded further by John Philoponus (Alexandria, 490—570 AD). He argued that light rays enter the eyes of perceivers, and that colours passing through air is not changed by it. Philoponus argued that light is a consequence of the nature of the Sun.<sup>6</sup> In the tenth century, Hasan Ibn al-Haytham (Basrah, 965—1040 AD), known as Alhazen in the west, in his *Book of Optics* argued that the eye is affected by the light that touches it and, by using a box with a pinhole in one side, saw that light travels in straight lines. The mathematician, Sir Isaac Newton (Woolsthorpe, 1643—1727 AD) proved that natural, white light can be refracted into several colours. However, that does not mean that

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<sup>2</sup> This brief ‘timeline’ is used to show a general direction of thought only.

<sup>3</sup> A. C. Grayling. *The History of Philosophy Three Millennia of Thought from the West and Beyond*. Penguin. On Kindle Scribe. 2019.

<sup>4</sup> Huffman Carl, “Alcmaeon”, *The Stanford Encyclopedia of Philosophy* (Summer 2021 edition), Edward N. Zalta (ed), URL = <<https://plato.stanford.edu/archives/sum2021/entries/alcmaeon/>>.

<sup>5</sup> Aristotle *The Complete Works of Aristotle De Anima*. Translated by J. A. Smith. Classic Books. KTHYK. 2023.

<sup>6</sup> Wildberg, Christian, “John Philoponus”, *The Stanford Encyclopedia of Philosophy* (Winter 2021 edition), Edward N. Zalta (ed), URL = <<https://plato.stanford.edu/archives/sum2021/entries/philoponus/>>.

those colours—often described as the colours of the rainbow—are ‘in’ white light. Rather, white light is refracted into a range of wavelengths.

John Locke (Wrington, 1632—1704 AD), wrote that the role of the superficial senses, should root thinking on what happens cognitively. Locke’s natural ‘direction’ of thought was from the superficial senses inward—the opposite of Empedocles. Locke wrote that all, ‘external material things, as the objects of sensation, and the operations of our own minds within, as the objects of reflection, are to me the only originals from whence all our ideas take their beginnings.’<sup>7</sup> Locke seems to say that sensory data is primary in the provision of information on the world, though more so than cognitive because it is the ‘foundation’ of cognitive givens. Objects bring about ‘ideas’ in perceivers because they have ‘powers to produce ideas in us by our senses, are looked on as real qualities in the things thus affecting us’<sup>8</sup>. Locke argues that phenomenal content, such as colour, is given to perceivers by external forces, and that ‘light and colours are busy everywhere, as long as the eyes are open’.<sup>9</sup> By adopting an empirical stance, Locke emphasised the role of the superficial senses in visual perception, and of the causal role of light on the eye.

It becomes apparent that the history of philosophical thinking, on both the real world and on perceptions of it, were increasingly turning inward to focus on phenomena. Locke’s concern with ‘operations’ of minds seems to speed that turn. Although Emmanuel Kant (Konigsberg, 1724—1804 AD) attempted to explain knowledge by linking experience with the rational mind. Kant had little to say on the real world—apart from criticising arguments for a realist-based understanding of it, even arguing that space and time are ‘formal’ features of the reflective mind, not a result of givens. However, he wrote that: ‘The light which plays between our eye and the celestial bodies, produces a mediate community between us and them, and thereby shows us that they coexist’<sup>10</sup>

With growth of the range of the natural sciences, particularly of physics, and the introduction of new technologies, so understanding on the contribution of light itself was developed further. Modern science shows that electromagnetic rays, emitted from a light source—by the Sun or a particular—enter the pupil of perceivers of it (so, Philoponus), and initiates other physical processes that culminate in visual perception. This marks the end of both Emission and of Extramission arguments in the philosophy of perception, with the suggestion that observers have minimal perceptual freedoms: perceivers are dependent on givens—what arrives as the result of physical processing. From around the mid-19th Century, with rapid growth of the physical sciences, so philosophers started to withdraw—and so, philosophy itself retreated—from attempting to explain the natural world, as begun under Thales, and from real causes of

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<sup>7</sup> John Locke. *An Essay Concerning Human Understanding. Book II: Ideas*. London, Presented by Jonathan Bennett. 2017. p18.

<sup>8</sup> Ibid. p.33.

<sup>9</sup> Ibid p19.

<sup>10</sup> Emmanuel Kant. Translated by, Norman Kemp Smith. *Critique of Pure Reason*. Macmillan & Co. London. 1929. p235.

modes of perception?<sup>11</sup> Science, and its tools, principally to aid the eye, were in the ascendent. The growth of psychology, from the late 20<sup>th</sup> Century, also began to impact on philosophy, further narrowing its scope. However, many philosophers maintained an interest in the sciences, some becoming known as philosopher-scientists, and vice versa.

In the late-twentieth century, Paul Churchland (Vancouver, 1942 AD), drew criticism for arguing that: "... light is simply identical with EM waves."<sup>12</sup> Although what Churchland meant by that short quote is not clear, he does not seem to be arguing that each term has the same referent? If so, what do 'light' and 'EM waves' refer to? On first reading it might seem that light and EM waves, correctly known as electromagnetic rays, are the same, but that the latter term arose in the modern era.<sup>13</sup> If rays are separate, physical entities then, given the physical sciences support for EM waves, it should follow that there is a sound argument against the existence of real 'light'. If that is so, and because the psychological effect of 'light' impacts so powerfully on the philosophy of visual perception—indeed in human general understanding of the world, on almost 'everything' visual,—it is necessary that light should, if it does not exist as a real entity, necessarily, be explained away.

The modern sciences have shown that electromagnetic rays are discrete objects. During visual perception they are reflected from all objects and in all directions, entering the pupil by the millions – every second. They are known, physical constituents of the world that can be both measured and manipulated (leading to the development of lasers). Rays overlap and pass through other rays, each retaining the wavelength of its source. It can be asked whether they fill all ambient space, between objects and the eye of perceivers? If these rays are discrete and, logically, 'fan out' the further they are from their source<sup>14</sup>, then how should light itself, as a separate, distinct entity, be defined?

Is it natural to conclude, though counterintuitively, that light—if conceived of as the opposite of electromagnetic rays—is 'solid'?<sup>15</sup> The argument is that, if light is in the world then, in a folk psychological way, it should fill ambient space. If so, it is necessary to conceive of 'light' as a full, all-encompassing entity? If it is 'solid'—though not of a hard, 'material' nature, that cannot be penetrated—through which colour passes to the eye then, can visual perception from multiple directions be possible through it? To carry data to the eye, a 'solid' light must flow—carry colour outward from a source. What, then, would cause that general flow? Does light itself have causal forces that

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<sup>11</sup> It should be argued that the physicist endures the same perceptual and physical stance as other perceivers. That is, all perceiving creatures are confined in, and by, their own particular ambient space. That space cannot be breached. Essentially, creatures move through the space that surrounds them. Ambient space, without which the superficial senses are redundant, is simply 'there'.

<sup>12</sup> Merrill Ring. *Scientifically Induced Conceptual Change? The Case of 'light'*. California State University, Fullerton. 2022.

<sup>13</sup> EM refers to electromagnetic waves. Doubtless, 'light' and 'EM waves' reflect the conflict between old and new thinking. Aristotle used the Ancient Greek word for 'light', whereas today—in our science dominated world—electromagnetic rays and electromagnetic theory (Maxwell) have come to dominate thinking in this area.

<sup>14</sup> It could follow that there is an argument here for the loss of clarity on looking at distant objects? I believe that Alberti had something to say on this?

<sup>15</sup> Aristotle did not think of light as composed of rays. It is more than likely that he conceived of it as a whole, that fills ambient space—as air does.

sends colour to the eye? If it does not flow, then what causes colour to pass through it, in multiple directions simultaneously? It would seem that, if light is a 'solid' then it should penetrate particulars, so ensuring that it absorbs its characteristics. It should follow, that other causal forces is necessary to ensure that movement, and transfer, of data from particulars. It is easy to confuse the causes of "EM waves", emission theory, with a surrounding 'light' that is, at its simplest, another metaphysical structure in the world, but is it important not to do so.

At its simplest, my argument is that there are no grounds for a foundation of seeing based on the concept of 'light'. Aristotle's explanation was probably as correct as it could have been—for the times in which he lived.<sup>16</sup> It is likely that the pre-Socratics attempted to find the essential, underlying principle of the world because they came to realise it as a physical, material place. To avoid a contradiction in that conclusion, light had to be physical too. Sound conclusions are contingent on initial understandings: true premises. For visual perceivers, light seems to fill the sky, and they came to believe that they are dependent on it. In the early, naïve era, and at a psychological level, it would have been difficult to argue against appearances. The child looks out at 'the world', and is told that it contains an entity—'light'—that causes visual perception. However, as with all things perceptual, the appearance of 'light' itself is no more than the giving of another 'colour'. Light is phenomena, and inferences on it inform on real sources; such as the Sun or fire. That there are "EM waves" only, entails that real light does not exist as a discrete, physical entity. The real world is a 'dark' place. The naïve perceiver looks, but cannot see.

It is not necessary to have two, discrete 'carriers' of information to the eye. If Reference 16 holds, then trailing EM rays are opaque—they cannot be looked through. It follows that visual knowledge of particulars, of all forms of direct perception, is not sound. The door onto the real world is closed—as it always was, and it cannot be opened. Therefore, and given that philosophy has gradually retreated from the real-world for more than two millennia, is epistemology reduced to thinking on the perceiver and on the content field? It cannot be argued that rational ideas are made here or there, which area of the cognitive mind they are given by. All ideas are givens. If content is the foundation of knowledge, and the perceiver knows what that content is—in the wider, rather than narrowest of meanings—then the only perceptual standard is the perceptual field itself. All perceptual judgments are founded on it alone. Without looking, it is not possible to see. Ultimately, it could be argued, if the perceiver looks at content only, then there are few perceptual freedoms.

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<sup>16</sup> An electromagnetic ray from a leaf, or other real entity, travels through ambient space to the eye. Only the leading point of a ray is absorbed by the retina at any one moment, while the trailing remainder travels forward from its source. If trailing waves cannot be absorbed prior to entering the retina, the trailing wave has no effect on visual perception. Therefore, trailing rays prevent visual perception of their source: they cannot be looked through. It follows that trailing rays are visually 'opaque'. Similarly with the four other senses.