

COLOUR VISION PERCEPTION IN ANCIENT GREEK LITERATURE*

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The Greek as a people have a keen sense of vision. They are a people who delight in inward¹ and outward vision that is to say they are a “theoretical” people. Other peoples like for instance the Hebrews, worship the ear and the sense of hearing. It is by means of these two that they listened to the word of God and received the Mosaic Law.

For the Greeks *being* is identical to *seeing*. Even in Homer’s time, Thetis addressing herself to the Nireides and Hephaestos, says about Achilles, “and whilst he lives and beholds the light of the sun” (The Illiad of Homer XVIII, 61). Moreover, let us not forget that Apollo was both the God of moral and spiritual light and the Sun God.

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Dedicated to the late Professor John Charamis, who loved Greek nature and colours, who profoundly studies ancient thought, and who inspired me in Ophthalmology.

1. The assimilation of thinking to a kind of mental vision. In Homer the verb “noein” is used for visual perception (Illiad 15, 422; 19, 112 etc.).

Visual sense evolved to utilize light. Light and seeing are identical. As Aristotle pointed out "Since light is the chief sense, the name *fantasia* (imagination) is derived from *faos* (light) because without light it is impossible to see" (Aristotle: On the Soul, 429a 4). The eye reflects the external world, thus enabling the eyesight to perceive it. To the ancient Greeks the eye was 'relative' to the object, so Plato and Plotin called the eye 'born of the sun'. This 'mystical' concept influenced the great poet Goethe, to write these verses:

"Wär nicht das Auge sonnenhaft,
Wie könnten wir das Licht erblicken?
Lebt nicht in uns des Gottes eigne Kraft,
Wie könnt' uns Göttliches entzücken?"²

(Goethes Werke, Insel Verlag, Vol.6, p.381)

The eye, the light and the illuminated object belong to correspondent worlds. The object becomes visible through the emitted light. Light moreover produces the sensation of *colour*. "What is visible in light is colour. Hence too, it is not seen without light; for, as we saw, it is the essence of colour to produce movement in the actually transparent; and the actuality of the transparent is light. The evidence for this is clear, for if one puts that which has colour right up to the eye, it will not be visible. Colour moves the transparent medium, e.g., the air, and this, being continuous, acts upon the sense organ." (Aristotle: On the Soul, II, 419a, 8–15). According to Plotin colour is the field of the mutual conflict and infiltration between light and matter (Enn. IV, E 7, 37–41).

According to tradition, the first people who applied themselves to the study of light are the Pythagorean philosophers of the 6th Century, BC. Nevertheless, not a trace of their researches has reached us. Another theory about light was later brought forward by Democritus who was followed by Plato and Aristotle.

According to Theophrastus, Democritus professes that only four of the colours that are observed in nature are simple: white, black, red and green (chloron). These four fundamental colours are born by the size, the shape, the position and the sequence of the atoms which form the objects. The principal colours are formed by the proportional blending of the four basic ones which correspond to the four primary elements that make up the universe (D. 513).

Here we can trace the main principles of the *opponent colour theory* advanced by Hering, as well as by the more recent psychophysical methods. This theory received its inspiration, as is well known, from the Neoplatonic interpretation of colour vision by Goethe (1810).

2. Were not the eye so radiant, / how could we perceive the light? / If God's power dwells not within us, / how could the God-like enchant us? (Author's translation)

Galinos states that according to Democritus, the formation of colours is governed by *laws*. People consider something as white or black, sweet or sour while in reality everything is *den* and *meden*, where *den* stands for the atoms and *meden* for the empty space.

The theory of Democritus and his tutor at the school of Abdera, Leukippos, about the atoms was verified in modern times. Moreover, even the fundamental principle of the transmission of visual stimuli and of their integration in the brain is based on the simple bioelectrical ON- and OFF-effect, the two principles that govern all physical phenomena and that underline the *kybernetic* approach to biological processes.

It was not only Democritus who accepted that the Universe and the laws are governed by two controversial laws, but other Greek philosophers as well state the same process expressed differently, as for instance Empedocles who says that the two principles are *philia* (love attraction) and *neikos* (strife).

Empedocles in his epos "About nature" has taught us the double activity of sight. According to him, the act of seeing through the eye is achieved either through the emanation of rays of "fire" from the eyes or through their receiving invisible particles of thin fire emitted from the luminous objects that surround us (Kirk and Raven, 1957).

The concept that the eye possesses its own light is old (Hom. N 474, T 565; Pind. Chapt. 140–41; Soph. Aias 69–70; Eurp. Iph. in Tauris, 194). If we wish to provide this aspect with a more scientific explanation it may have its origin in the impression of showers or flashes of light we have whenever we exert a hard pressure against our ocular globe (Ploton Enn. v. 57,23–29).³ "When the eye is pressed and moved, fire seems to flash out." (Aristotle: On Sense, 427a 24).

Plato includes his theory about colours in his more general theory about light. "Concerning colours, then, the following explanation will be the most probable and worthy of a judicious account . . ."

"Of the particles which fly off from the rest and strike into the visual stream, some are smaller, some larger and some equal to the particles of the stream itself. Those, then, that are equal are imperceptible and we term them 'transparent' . . ."
(Plato, Timaeus 67 D)

In "Theaetetus" (153–154) Plato penetrates more deeply into the conception of colour and states that colour neither is a quality of the object nor does it depend exclusively upon the observer. Moreover, he adds that a dog or some other kind of animal may have different perceptions of the same colour.

3. This conception may also have its origin in the times of Homer when the rays were emitted from the Sun God and his eyes.

“Then it will be apparent that black or white or any other colour whatsoever is the result of the impact of the eye upon the appropriate motion, and therefore that which we call colour will be in each instance neither that which impinges nor that which is impinged upon, but something between, which has occurred, peculiar to each individual. Or would you maintain that each colour appears to a dog, or any other animal you please, just as it does to you?” (Plato, *Theaetetus* 153–154)

For Aristotle the senses are in themselves mere potentialities. This is true for the visual sense also. To be actualized they must be acted upon by sensible objects. This actualization for colours requires a medium. Light is indirectly the colour of the transparent; for whenever there is a fiery element in the transparent, its presence is light, while its absence is darkness. What we call *transparent* is not peculiar to air, water, or any other body so described, but a common nature or potency, which is not separable but resides in these bodies and in all others, to a greater or lesser extent; hence just as every body must have some bound, so must this. The nature of light resides in the transparent when undefined; but clearly the transparent which inheres in bodies must have a bound, and it is plain from the facts that this bound is colour; for colour either is in the limit or else is the limit itself. This is why the Pythagoreans called the surface of a body, its colour.

In brief, Aristotle believes that “sense is that which is receptive of the form of sensible objects without the matter” (Aristotle: *On the Soul*, II, 424a, 19) and a sort of mean between the relevant sensible extremes. This is how we can discern sensible objects. For him, mind is indispensable for this conception of light and colours. Natural phenomena were to be viewed as a direct expression of ideas and thoughts also being dependent on objective reality and the sensorium upon which they react. This approach makes Aristotle a forerunner of Augustine and Descartes.

The idea that the *brain* constitutes the center of all senses had been brought forward by Alcmaeon of Croton (500 BC). He was the first to talk about the existence of optic nerves as it is mentioned by the Latin writer Chalcidius and by Theophrastus (D 506).

Epikouros (Diog. LX, 68–69) was one of the first who discovered that the colour of the objects varies according to the light which illuminates them, and thus came to the conclusion that they didn’t possess their own colour. Descartes as well as some other philosophers, agreed with this opinion. Ploutarchos and later Galinos define colour as ‘a visible quality of the object’ (Ploutarchos, *Ethics* 883 C, Galinos T 19,257, KUHN).

This brief reference to a limited number of extracts by Greek writers and philosophers provides us with a more general aspect of their conception of light and colours interlaced with their more general doctrines and perceptions. We thus observed that they didn’t accept the existence of colour in itself but as a result of the atoms’ movement, an idea that could be regarded as the root of Planck’s theory.

We have traced the ideas of Aristotle and Plato, which influenced deeply the first modern scientists who were concerned in the study of colour. Some of the ancient Greek writers accepted the objective existence of colour as a quality of matter, whereas others argued that the nature of colour was purely subjective and unstable (Epikouros).

These theories appear to be imbued with symbolic, mystical and other influences. Thus, while the titanic spirit of the philosophers of that time grasped part of the quality and nature of colour, the lack of experimentation and of objective as well as factual observation, make it impossible to confirm or reject the correctness of these theories. Plato talks about a spiritual *centre*, which uses the senses as receptors:

“Yes, for it would be strange indeed, my boy, if there are many senses ensconced within us, as if we were so many wooden horses of Troy, and they do not all unite in one power, whether we should call it soul or something else, by which we perceive through these as instruments the objects of perception” (Plato, Theaetetus 184–188).

Thus, the ancient Greek Spirit opens the gate towards truth, towards scientific authentic judgement, towards the unhidden reality, the *Unverborgenheit*, as the great contemporary philosopher Heidegger names it.

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**KOLIOPOULOS, J. – Perception de la vision colorée
dans l'ancienne littérature Grecque**

Resumé

Déjà dans la Grèce ancienne les théories concernant la vision des couleurs intriguaient les philosophes comme Aristote, Démocrite, Empédocles, Platon et d'autres. Cet article rapporte quelques unes de ces théories en même temps que certaines conceptions plus générales concernant la nature de la lumière et de la sensation. Les théories des philosophes grecs ont influencé les premiers scientifiques modernes, qui ont étudié la vision des couleurs.

**KOLIOPOULOS, J. -- Percepción de la visión de los colores
en la literatura griega antigua**

Resumen

Ya en la Grecia antigua la teoría concerniente a la visión de los colores intrigaba a los filósofos como Aristóteles, Demócrito, Empédocles, Platón y otros. Este artículo narra algunas de esas teorías al mismo tiempo que ciertas concepciones más generales concernientes a la naturaleza de la luz y de la sensación. Las teorías de los filósofos griegos han influenciado a los primeros científicos modernos, que han estudiado la visión de los colores.

KOLIOPOULOS, J. – Colour vision perception in ancient Greek literature

Summary

Even in Ancient Greece, theories concerning the colour vision, puzzled philosophers' mind, e.g. Aristotle, Democritus, Empedocles, Plato and others. This article relates some of these ideas as well as some more general concepts concerning the nature of light and sensation. The theories of the Greek philosophers influenced the first modern scientists, who studied colour vision.

**KOLIPOULOS, J. – Auffassungen über das Farbsehen
in der alten griechischen Literatur**

Zusammenfassung

Schon im alten Griechenland gaben die Theorien über das Farbsehen den Philosophen Aristoteles, Demokrit, Empedocles, Platon und anderen zu denken. Dieser Artikel faßt einige dieser Theorien sowie gleichzeitig verschiedene allgemeinere Auffassungen über die Natur des Lichts und des Empfindens zusammen. Die Theorien der griechischen Philosophen haben die ersten modernen Wissenschaftler, die das Farbsehen studiert haben, beeinflußt.

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