

## The Eye Light Reflection in Fine Art

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### Introduction

It is usually said that the eyes are our windows to the world, as well as the windows to our soul [1, 2]. The light reflection in the eyes is a sign of our living existence, a "spark of life" which we, along with the eye expression, exchange with other people in gaze communication [3]. The classical artists often depicted the eye reflection as an important part of the psychological presentation of the portrayed persons [4].

The aim of this study was to examine the eye light reflection in sculptures and paintings from Paleolithic times to the modern era. Within this period, the absence and presence of the reflection were noticed and, in the latter case, its position in the eye, its size, shape, intensity, and color were described. Some metaphorical meanings of the eyes and their reflection in artworks were considered, as well as their anthropologic significance.

### Materials and Methods

We have provided, read and analyzed a large body of references from art history, mythology, psychology, symbolism, anthropology, and philosophy. The main work comprised an examination of 3,129 reproductions of human

statues, anthropomorphic items, animal figures, reliefs, mosaics, and various installations, as well as 10,172 reproductions of portraits in paintings, drawings, art photographs, and digital works. In addition, several thousands of artworks were examined in Google Images Search.

### Results

Our findings will first be presented chronologically, and then in relation to the mentioned features of eye light reflection.

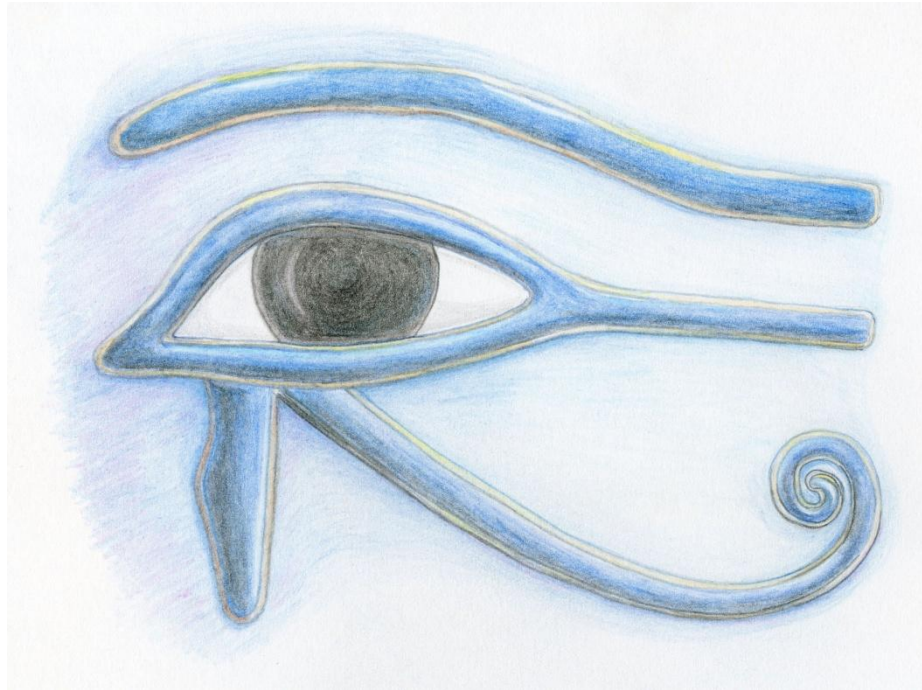
### Eye Reflection Throughout the Art History

About 30,000 years ago, Paleolithic man made stylized but fine figures with small holes instead of eyes [4]. Some 5,000 years ago, the Sumerian civilization in Mesopotamia modeled many human figures with very large eyes, made of lapis lazuli and shells, which reflected the ambient light. The same material was used in creating the eyes of a fine *Bull Lyre* dated 3,700 years ago. On the famous *Ishtar Gate* of the 6th century BCE from Babylon, the eyes of the presented humans, animals and certain mythological creatures were made of glazed bricks.

Some 3,360 years ago, the glass eyes with a reflection were designed in an ebony bust of the Egyptian *Queen Tiye*. Soon after, a fine sculpture of the *Queen Nefertiti* was created with the rock crystal eyes reflecting light[4]. The beautiful *Tutankhamen* mask of gold, dated 3,330 years ago,

showed the reflecting eyes made of quartz and obsidian. The first painted reflection in a mummy portrait dated only from the 3rd century BCE. The eye of the god *Horus* (Figure 1) became one of the most important symbols in this civilization.

**Figure 1:** The *Horus eye*, an important symbol in ancient Egyptian culture. (Drawn by S. Marinković).



Minoan creators in Knossos designed a fine *Bull's Head* with crystal eyes[4]. Greek artists produced some 2,500 years ago a fine bronze sculpture of *Riace Warrior* with glass-paste eyes. In the Roman copy of the 4th BCE Greek mosaic, the eyes of *Alexander the Great* show an imitation of light reflection.

In the 1<sup>st</sup> century ACE, a Roman artist created a bust of the emperor *Caesar* with marmorial eye inlays. In a mosaic *Still-life* from Pompeii an imitation of the light reflection was made in the eyes of the presented animals. A light reflection is most effective in *The Family of Septimius Severus* painted in tempera.

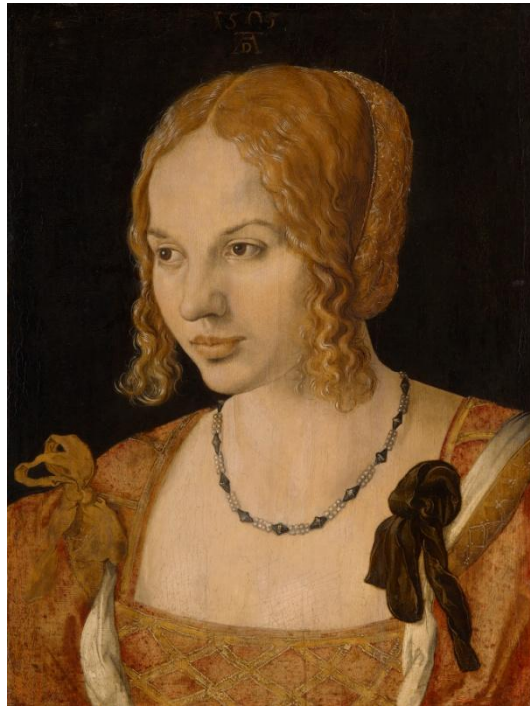
The ancient Chinese created many animal and anthropomorphic figures, including *Buddha* statues, of gilded bronze with the eye light reflection[5]. They also made color drawings on silk, but without presenting the reflection. It was the same case with the Japanese artworks. The ancient Indian sculptures artistically presented *Buddha* and the supreme beings in the Hinduism, such as *Brahma*, *Vishnu* and *Shiva*. The latter deity was often created with a third eye.

The Toltec civilization in Meso-America produced in the 5th century ACE a mask with inlaid eyes made of shell and obsidian, i.e. volcanic glass stone, which reflected the ambient light. The Maya and Aztec cultures used similar materials until the 16th century, but also turquoise and gold pyrite occasionally. Finally, the Mixtec civilization created fine animal figures of the rock crystal, whose eyes reflected light.

Christian medieval artists produced many sacral artworks[4, 6-8]. A gold sculpture of the *Virgin of Essen* has eyes made of enamel. The eyes of *St. Benedict* in a 9th century fresco in the Cathedral of Malles (Austria) were presented with some corneal light reflection. Within Byzantine art, a reflection appeared in a 16th century fresco of the *Virgin* in a Kremlin church.

Among the 15th century Renaissance artists[9], Italian sculptor Donatello created the *Prophet Jeremiah* with the expressed light reflection. A strong reflection is present in Luca della Robbia's artworks in enameled terracotta. Leonardo da Vinci and Albrecht Dürer[4, 9] reached perfection in painting the eye reflection (Figure 2).

**Figure 2:** *Portrait of a Young Venetian Woman* painted by Albrecht Dürer. (Permission of the Kunsthistorisches Museum,



The baroque masters Caravaggio, Titian and others often depicted the reflection[10]. The baroque park *Peterhof* (Russia) was decorated with dozens of gilded gold sculptures reflecting ambient light (Figure 3).

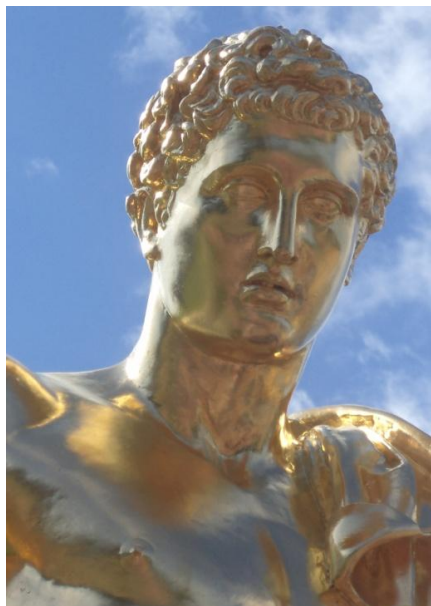
In Neoclassicism and Romanticism of the 18th century[11, 12], Houdon made a sculpture of the philosopher *Voltaire* with a slight light reflection appearing from his vivid eyes. The painters Ingres, Goya, Delacroix and Géricault depicted a typical light reflection. Later on, the realist Courbet presented it in his *Self-Portrait*[13].

The symbolist Henry Fuseli, inspired by a Shakespeare's drama, painted an impressive eye reflection in *Lady Macbeth Sleepwalking*[14]. Max Klinger made the eyes of John the Baptist from amber. Gustav Moreau depicted *Jupiter and Semele* with an expressive gaze showing the eye reflection.

Many impressionists and post-impressionists, such as Renoir, Degas, Sisley, Monet, Manet, Gauguin, Cézanne, Lautrec and van Gogh, have often carefully depicted the eye reflection[15, 16]. In contrast, the majority of expressionists failed to present the reflection[17]. Yet, Edvard Munch frequently painted the reflection in his portraits.

Twentieth century sculptures and installations rarely showed the eye light reflection[11, 18]. Still, the surrealist Salvador Dalí made several pieces of blue jewelry eyes which strongly reflected light. A ready-made work, *The Tear*, was produced by English artist Woodrow. On the other hand, Alfonso Ossorio included into his installations many eye models with a reflection. The same was done by Tom Friedman in his artwork *Green Demon*[19]. Tony Tasset produced a thirty-foot eyeball sculpture installed in Chicago.

**Figure 3:** A gilded gold sculpture of Peterhof near Petersburg. (Courtesy of the Peterhof authorities. Photo S. Marinković).



The reflection was also less frequent in 20th century paintings[18-23]. One of the exceptions was Picabia with his work *Cacodylic Eye*. Similarly, the artist Néstor depicted a reflection in his dramatic scene –*Poem of the Atlantic*[14]. Marc Chagall, the ingenious symbolist and surrealist painter, presented the eye reflection frequently, like the surrealist Salvador Dalí[4]. René Magritte depicted an effective eye reflection in *The Ignorant Fairy*, but he failed to do that in his famous painting *The False Mirror* with the clouds in the iris. Frida Kahlo painted the eye reflection in many of her

portraits, including that in a third eye on the canvas *Sun and Life*. The symbolic compositions of Joan Miró often contain one or more eye images. Finally, the pupils in the Gieger's portrait *Carmen I* produce each a tiny light beam.

The reflection was caught by many photographers, for instance by Herbert Bayer in his work *Lonesome Big City Dweller*, and Jaromir Funke in his series *Time Persists*[18, 24]. The reflection was digitally created by many artists, such as Elizabeth Leggett (Figure 4), Andy Simmons, Chuck Siebuhr and Duncan Long[25].

**Figure 4:** *Summer Muse*. A digital artwork designed by Elizabeth Leggett. (Credit: Grant J, Vysniauskas A. Digital art of the 20th century. Renderosity, AAPPL, London, 2003, c/o [info@aappl.com](mailto:info@aappl.com)).



## Features of the Reflection

We noticed that the corneal reflection can be present at any level of the pupil and iris, sometimes expanding to the neighboring sclera as well (Figure 5). However, it was most often positioned across the border between the pupil and iris, especially in their upper part (Figures 2 and 5a). The reflection is most often in the form of a small bright and round spot, and it is less frequently bar-shaped or like an arch (Figure 5b). It is rarely present at the level of one part of the pupil (Figure 5c), for instance in Gieger's portrait *Li I*[14], or it occupies almost the whole pupil (Figure 5d), for example in Schoenberg's *The Red Gaze*[17].

The second frequent location was at the level of the iris, usually like a small spot (Figure 5e), for instance in Kiprensky's portrait of the poet *Pushkin*[26]. The reflection is sometimes like a bar or an arch across the iris (Figure 5f), as noticed in Klimt's *Portrait of Johanna Staude*[14]. The

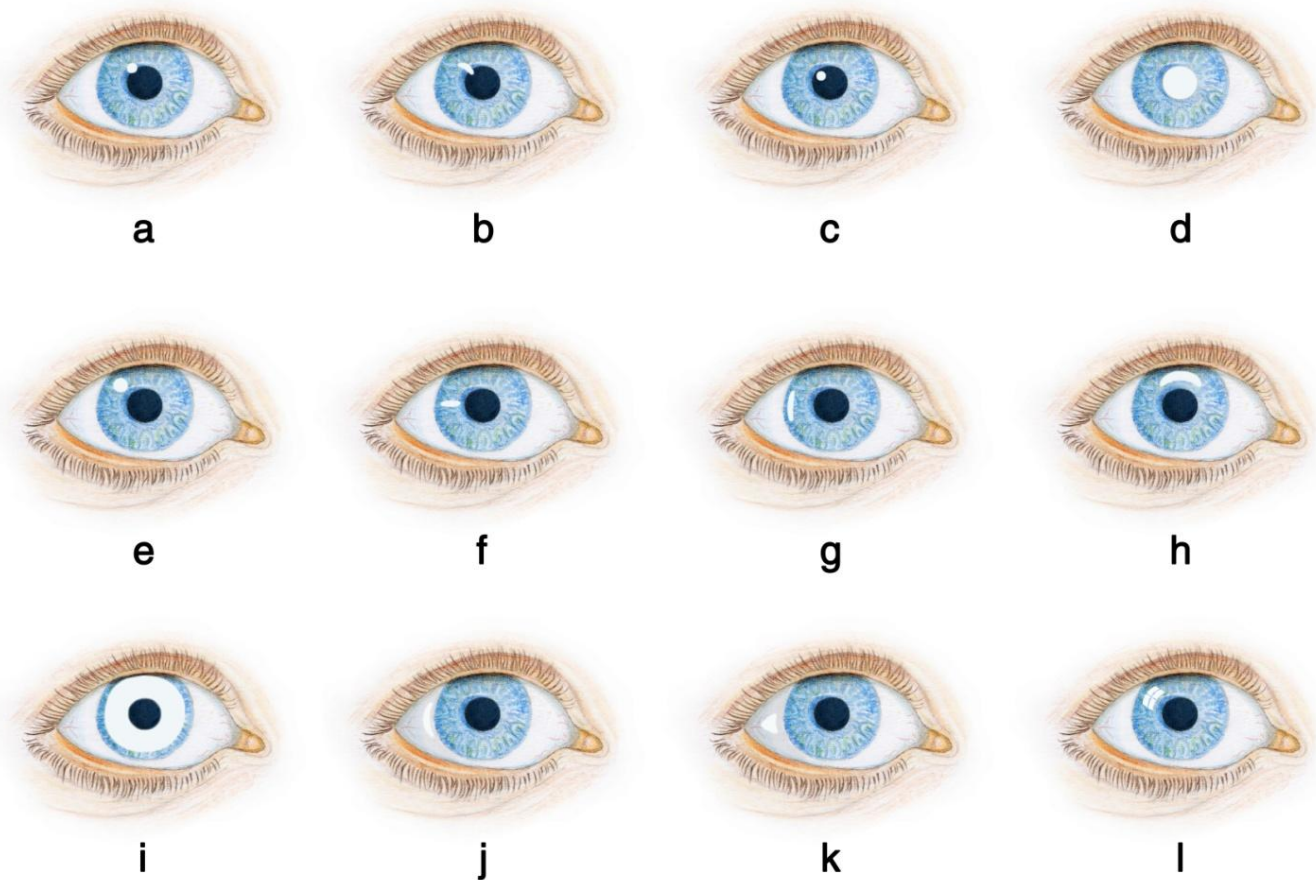
reflection more often lies close to, across, or at the border with the sclera (Figure 5g), as revealed in Titian's *Woman With a Mirror*[4]. It can occupy a larger part of the iris (Figure 5h), like in da Vinci's drawing *Head of Infant*[9] or most of its circumference (Figure 5i), for instance in a digital work entitled *the Summer Muse*[25] (Figure 4).

A reflection can also occupy a part of the sclera, either in the form of an arch concentric to the limbus of the cornea (Figure 5j), or like a triangle just lateral to the cornea (Figure 5k), as seen in Géricault's portrait of *Alfred Dedreux*[12]. The most effective scleral reflection was presented by Martial Raysse in *Made in Japan en martial color*. In rare cases, a reflection extends all the way across the sclera, iris and pupil, for example in Salvador Dalí's eyes composition created for Hitchcock's film *Spellbound*.

The reflection is rarely in the shape of a light source, for instance, of a nearby window (Figure 5l), as seen in several portraits by Dürer[4]. Centuries later, the photographer

Irving Penn caught a window reflection in the eye of the ballet dancer Nurejev[24].

**Figure 5:** Various types of singular eye reflection (a–l). (Drawn and photoshopped by S. Marinković).



The multiple, predominantly double, eye reflections are less frequent. They can be located at the level of the pupil and the iris, as seen in Holman Hunt's *Light of the World*, or both in the region of the pupil or the iris, respectively, for instance in Alfred Mucha's portrait *Reverie*[18]. A complex eye reflection was depicted by Madox Brown in *The Last of England*, as well as by Boccioni in his *Modern Idol*[4].

The shape of the reflection was already mentioned: round or bar-like, and in the form of an arch, ring, triangle or a rhomboid. The first two forms are the most common ones. As regards a triangular shape, it is seen in Max Ernst's work *The Escaper*, in many Escher's graphics, and in the photomontages by Jaromir Funke[4, 18, 24]. A rhomboid reflection was presented, for instance, in Escher's work *Eye*.

The reflection is usually a small-sized one, rarely of a medium or large size. The intensity of the reflection is most frequently strong, and it is usually white or grayish, rarely other colors. It is more often located in the upper part of the eye, and less frequently at the middle level (Figures 5f and 5g), for example in Gauguin's painting *Two Tahitian Women*[15], or in the lower portion, for instance in Picabia's artwork *Portrait of a Woman*[4].

There is commonly a right-left symmetry of the reflection, i.e. it is usually located in the same place of both eyes

(Figure 2). In some instances, the opposite reflection is smaller or darker than the ipsilateral one, but it is rarely absent, for example in Chagall's *Self-Portrait* of 1914.

## Discussion

First of all, the absence of the eye reflection will be discussed, and then the physical basis of the reflection, as well as its features in fine art. In addition, its anthropologic significance will be considered, as well as its imitation by nature.

### The Absence of Reflection

Understandably, a reflection is absent when the eyes are not painted or not made in a sculpture, for instance, in the Cycladic figures a few thousand years ago[4] and in the *Sleeping Muse* modeled by Brancusi in the 20th century[11]. Similarly, there is no reflection when the eyes are closed, for example in presentation of dying or sleeping individuals, and in certain psychological situations, as shown, for instance, in Bernini's marble sculpture *Ecstasy of St. Theresa*[10]. The reflection is also absent in Chinese, Japanese and Hindu drawings and paintings[5], as well as in some modern art

works[18-25, 27]. Finally, the corneal reflection does not exist when a person is portrayed in a diffuse light, such as

### Physical Basis of Reflection

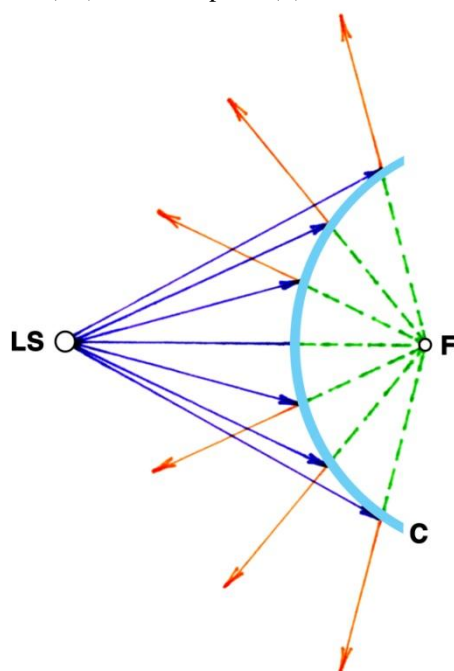
The cornea is a smooth, curved, wet, and transparent anterior part of the eyeball[28]. The first two features of the cornea are responsible for its light reflection, curved images, and some spheric aberration. The cornea behaves, actually, like a convex spherical mirror[29]. There are fine artistic examples in that context: van Eyck's mirror image in painting *Arnolfini and His Wife*, Parmigianino's *Self-Portrait* in a glass ball, Escher's *Reflecting Globe*, and Anish

Leonardo's *Mona Lisa*[4].

Kapoor's *Cloud Gate* made in 2004 for the Millennium Park in Chicago[4, 19].

Nevertheless, when a light ray (the incident ray) from a source of light strikes a point on the corneal surface, it is reflected (the reflected ray) under the same angle as the incoming incident ray (Figure 6). The prolongations of the reflected rays, actually the virtual rays, intersect behind the cornea in the focal point[29]. In the case of an object, its image will be in an upright position, reduced in size, and in front of the focal point. Finally, because of the curved surface of the cornea, the image formed will also be curved (Figure 51).

**Figure 6:** The physical basis of the corneal light reflection. Note the incident rays (violet), reflected rays (orange) and virtual rays (green), the light source (LS), the focal point (F), and the cornea (C). (Drawn by S. Marinković).



### Reflection in Sculptures

In order to produce a shining effect of the eyes, certain smooth materials were used in sculptures: shells, lapis lazuli, enamel, ceramics, copper, brass, silver, gold, polished bronze or marble, glass, obsidian, quartz, rock crystal, semi-precious minerals or precious stones[4, 7-12]. Some contemporary artists introduced modern materials, such as plexiglass, fiberglass and acrylic, with a high ability of light reflection[11, 18, 19].

### Reflection in paintings

Imitation of the reflection from the eyes in paintings and mosaics started in ancient times, i.e. around the 3rd century BCE in Egypt, and then especially in the Hellenistic and Roman period[4]. The reflection was generally absent in early medieval paintings. The first reflection was noticed in

a 9th century fresco in Austria[8]. From the Renaissance period to the present, it appeared more or less regularly in the paintings and drawings, and lastly in photography and digital art [9, 10, 12, 13, 15-27, 30, 31].

### Features of Light Reflection

It is obvious that several types of eye reflection can appear: the corneal, iridic, scleral, or combined (Figure 5). The typical, corneal reflection is most often present in the upper part of the eye (Figures 5a-5c, 5e, 5h and 51). The iridic reflection is expressed as its good illumination. The scleral reflection is usually produced by a stronger light source. The type, position, size and shape of the reflection mainly depend on the same features of the light source, but also on the gaze direction of the portrayed person.

As regards the multiple reflections from an eye, they are due to several or complex light sources which illuminate a

portrayed individual (Figure 5). They can also be seen in the painted eyes in tears, for instance, in Titian's *The Penitent*

Some artists drew special attention to the eyes with a light reflection. Thus, the symbolist Redon of the 19th century made dozens of eye drawings with a reflection of light, for instance, those like balloons levitating in the air or floating on the water surface. Several photographers created many photomontages of the eyes with a reflection [18, 24]. Modern author Tony Oursler produced numerous eyeballs of plexiglass [19].

## The Eyes in Anthropology

There is a certain meaning of the presentation of the eyes, especially modified ones, and their light reflection.

Large round eyes of the mentioned Mesopotamian figures were probably "a channel of communication with the gods" [4]. The eye of *Horus* (Figure 1), the son of Isis and Osiris who was the „Lord of Eternity,“ became extremely important in the Egyptian culture. Besides, the Egyptians believed that the first people were created from tears that dropped from the eyes of the creator god [31].

The mentioned Roman bust of *Caesar* shows a high intelligence, psychological strength and energy, while his blistering eyes potentiate the impression of a supernatural

*Magdalen*, and El Greco's *The Penitent St. Peter* [4].

power of the great Emperor. His real power was so impressive that his name *Caesar* passed into other languages (Rus. *tzar*; Germ. *Keiser*).

In the Taoism, Hinduism, and Shinto religions, the right eye symbolizes the sun, and the left one the moon [32]. Their synthesis became *Ming* (light) in China. The Hindu civilization respected a third eye in the deity Shiva. On the other hand, a single eye was mentioned in the giant *Polyphemus* in ancient Greek mythology, who was blinded by the hero Ulysses in the Homer's *Odyssey* [33]. And yet, the mythological shepherd *Argos* possessed hundreds of eyes distributed all over his body.

God's eye, which sees everything, is sometimes presented as the sun [6]. Such an eye within a triangle is a symbol of the Holy Trinity. This also became a symbol of the Freemasons [32]. The same image with an eye reflection is printed on the American banknote of a Dollar.

Some superstitions related to the eyes are strong in the Turkish and Arab peoples, and in some other nations [32, 34]. They believe in the "evil eye" and try to protect themselves by using specially designed blue eyes as amulets (Figure 7).

**Figure 7:** A Turkish amulet against the "evil eye." (Photo S. Marinković).



There is a certain metaphorical meaning of the eyes with a reflection in some works of art. For example, Elizabeth Leggett's *Summer Muse* with blistering eyes (Figure 4) is presented as a modern goddess of inspiration in art, giving us from the right hand her spirit in the form of a brightly radiating spot of light.

Some authors potentiate the face or eye expression to present, in an artistic way, certain psychological traits or states of mind, especially intelligence, temperament, attention and emotions, as shown in the mentioned 1st century bust of *Caesar*. Two millennia later, the famous photographer Irving Penn made a portrait of Picasso [24],

whose penetrating gaze is ready to scan and analyze any person or item it spots. Similarly, Alfred Eisenstaedt registered an impressive stabbing gaze with a reflection of the English painter Augustus John.

Salvador Dalí's huge eye composition for the mentioned film by Hitchcock inspires fear in viewers. Tom Friedman's *Green Demon* produces both „Frankenstein and voodoo associations“ [19]. A similar impression arises when looking at Caravaggio's mythological *Head of Medusa*, or at Guido Reni's painting of the biblical *Massacre of the Innocents* [4].

On the other hand, the eyes with a reflection in thousands of portraits in art history show happiness, charm, beauty,

attraction, romantic love, erotic connotation and similar

## Imitation of a Light Reflection by Nature

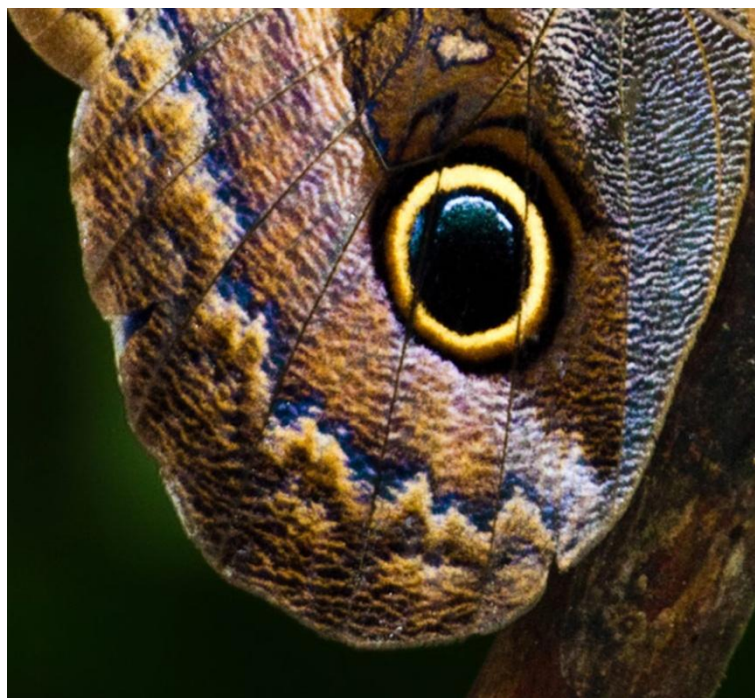
One single example is enough to illustrate the creativity, perfection and ingenuity of nature: the owl butterfly. This nice insect (Figure 8), in order to protect itself, developed two large eyespots on its hindwings during evolution, which resemble the eyes of the owl, a well-known predator [35, 36]. Each spot contains a small bright area, usually arch-like or

positive expressions and emotions.

semilunar in shape, which perfectly imitates the eye light reflection (Figure 8).

In spite of various theories and mechanisms proposed [30, 36], especially gradual changes in those genes which determine the synthesis of various pigments and their peripheral distribution and arrangement, it is still not known how those eyespots developed so perfectly – not to mention the additional imitation of the corneal light reflection itself.

**Figure 8:** The hindwing of an owl butterfly. (Photo credit: William Holsten, [www.billholsten.com](http://www.billholsten.com)).



## Conclusion

It is obvious that the eye light reflection was presented in sculptures and mosaics since ancient times. A reflection in paintings started in the 3rd century BCE and continued to the present. It was located at the level of the pupil, iris and/or sclera. The reflection was depicted or modeled either

in ordinary individuals, or in mythical, supernatural or phantasmagoric creatures.

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