HISTORY OF THE EMERGENCE AND SPREAD OF THE SCIENTIFIC TERM "PERSPECTIVE" IN THE THEORY OF IMAGES

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A B S T R A C T	K E Y W O R D S
The article states that when the scientific term "Perspective" appeared in the theory of images and was widely spread around the world, the great merit of the work "Book on Optics" by the famous scientist of the East Abu Ali Hassan al Haysam (965 – 1040).	drawing tools, geometric constructions, conic sections, optics (the science of vision), pinhole camera, "book about optics", perspective, descriptive geometry, engineering graphics.

INTRODUCTION

Much science has been devoted in the past to developing the theoretical foundations of imaging. The most important of them are "Geometric constructions" and "Optics" about vision.

Knowledge of "geometric constructions" has been the main part of geometry books since ancient times. In the Middle Ages, books on geometric constructions written by Farobi and Abul Wafa, based on the works of ancient Greek and Byzantine scholars, and works similar to theirs were used to learn how to make accurate images.

Abu Nasr Muhammad al-Farabi (873 - 950), known as "Muallimi Sani" and "Aristotle of the East", contains the following topics in the 10-chapter "Book on Geo-metric Constructions": 1) Determining the center of a circle ; 2) making equilateral forms; 3) making inscribed shapes in a circle; 4) make an outer circle to the given shape; 5) make an inner circle to the given shape; 6) making some other forms inside and outside some given forms; 7) dividing the triangle into parts; 8) dividing rectangles into parts;

9) dividing squares into parts; 10) dividing the spheres into parts. The author described the rules noted in these topics while solving a total of 130 problems [1].

The content of the book of Abul Vafa Buzhoniy (940-998) was as follows: 1) about the ruler, circle and gony; 2) about the rules that need to be kept in mind at the beginning; 3) about the construction of regular forms; 4) about the construction of shapes drawn inside the circle; 5) about the construction of circles drawn outside the shapes; 6) about the construction of circles drawn inside the shapes; 7) about the construction of forms drawn inside other forms; 8) about the distribution of triangles; 9) about the distribution of squares; 10) about constructing m2 from n2 and vice versa; 11) about the distribution of equilateral parallelograms; 12) about connecting circles; 13) about tessellation of the sphere [2].

It is particularly noteworthy that the last chapters of these two famous books on geometric constructions are entitled "Dissection of the Sphere". These chapters deal mainly with regular polygons. The 10th century scientist Abu Abdullah al-Khwarizmi in his encyclopedic work "Mufatih al-Ulum" ("The Key of Knowledge"), "arzi" ("earthly"), "moyy" ("watery"), "hawaiy" ("airy"). "), gives an explanation of regular polyhedra such as "noriy" ("fiery"), "falakiy" ("heavenly"), which we now call respectively cube, icosahedron, octahedron, tetrahedron, dodecahedron.

"The science of "geometric constructions" was engaged in searching for ways to solve the problems of how to write pictures or drawings of similar geometric objects on paper with a pencil.

Now let's turn to the history of the emergence and development of the science of "Optics" about seeing with the eyes. The first book called "Optics" was published in Alexandria. av. It was created by the Lebanese Euclid (365-300 BC) in the III century. Similarly, the book "Optics" was created by Ptolemy in the city of Alexandria in the II century [3], [4]. In the sources, the names of past scientists such as Apollonius, Theodesius, Pappus, Seren, Proclus, Campano, Nimorarius are also mentioned as authors who wrote works on this topic. Al-Kindi (801 – 873), al-Nasrani (died 910) and al-Haysam are honored as scientists who wrote works on optics in the Near and Middle East [3]. Among them, the life and scientific work of Abu Ali Hasan ibn al-Haysam al-Basri (965 - 1039/41), who has a certain share in the management of one of the major branches of the science of "Drawing geometry" as "Perspective", is exemplary.

Al Haysam was born in Basra in 965. Due to his extraordinary abilities, he worked as a minister of the governor of his country - Basra. But the strong desire to seek knowledge and collect knowledge is the basis for him to leave such a prestigious position and move to the Baghdad scientific center. After completing his studies, he

moved to Cairo, the center of the Fatimid caliphate, and practiced medicine at the court of Imam-Caliph Al-Hakim (996-1021).

The medieval Syrian scholar Ibn Abu Usayba mentions 92 works of al-Haytham in his book "Source of Information about Physicians of Various Categories". 89 of them are related to mathematics, astronomy, optics and mechanics

Among the works he wrote are "Treatise on Light", "Treatise on the Light of Lamps", "Treatise on Parabolic Incandescent Mirrors (in this treatise on the equality of the angles of incidence and return of the light beam to the plane, on reflections from concave surfaces, the practical making of parabolic mirrors and etc.), "Treatise on circular burning mirrors", "Ptolemaic optics", "On the colored ring of the moon and the rainbow of colors", "Book on the image of the world", "On the quadrature of the circle", "Sharni on measurement", "On the construction of regular heptagons", "On the construction of a regular pentagon interior to a square", "On the properties of the altitudes of a triangle", "On the graph that draws the sections of a conic", "On extracting the cube root of a number", "On the parabola ", "About the hyperbola", "About the miraculous square", many treatises were published. In his "Treatise on Eclipses" al-Haytham talks about the space we now call the "camera-obscura" ("a dark room with a chimney hole") (Fig. 2) and the results of a series of experiments he conducted using it.

The work that made Al-Haytham famous in the world is his "Kitab al-Manozir" written around 1027. The work consisted of seven treatises. The titles of these treatises were as follows: 1) on vision and the eye, 2) on the propagation of light, 3) on errors in vision, 4) on reflections from the surfaces of mirrors, 5) on imagination, 6) on plane, cylindrical and conical surfaces. about errors in seeing reflections in mirrors, 7) about refraction of light and about errors of vision caused by refraction.

The contents of other works belonging to Al-Haysam's work can be cited in this way. For example, in his book about eclipses, al-Haytsam described the camera obscura device he invented and the underlying theory behind it.

In the 12th and 13th centuries, in the Muslim region of Europe - Spain, the translation of rare works written in Arabic or translated from other languages into Latin, the European language of science, became popular. Adelard of Bat, Gerardo of Cremona (1114-1187), Robert of Chester, John of Seville stood at the head of this good work.

In the middle of the 12th century, among the works of many famous oriental scholars,

Gerardo Ali Hassan ibn al-Haysam al-Basri from Cremona translated several books, among them his "Kitab al-Manoziri" under the names "De Aspectibus" and "Perspectivae" into Latin. did

It is not an exaggeration to say that these books were of particular importance in the development of scientists such as Bacon and Peckham, who were seriously involved in the science of optics in Europe in the 13th century. The famous naturalist Roger Bacon (1214-1292), who grew up under the influence of Al-Haytham's books, conducted many experiments on light rays with the help of his camera-obscura and lenses of various shapes. Developed the theory of glasses. By the end of the 13th century, production of convex and then concave glasses was started in Italy [5]. This created the idea that drawing a picture of what is being looked at is a matter of enlarging and making visible the invisible picture in the eye of the eyeglass.
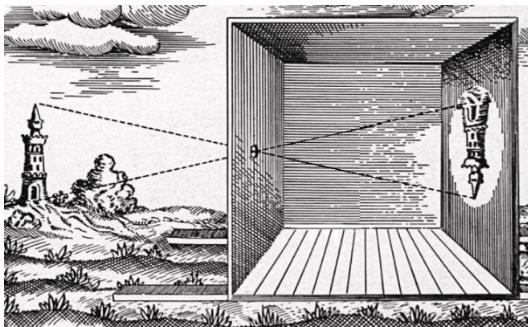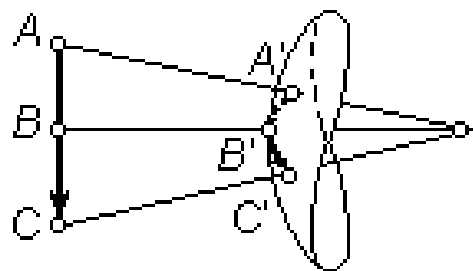

Figure 1. Al-Haysam's camera obscura

Figure 2. Optical image of an object on the cornea according to Al-Haysam.

The Polish architect Vitelo (1225-1280) named his ten books on optics "Perspective" (Latin: "seeing inside"). In writing this book, he made good use of al-Haysam's collection of works on optics ("Opticae thesaurus") [4]. For example, al-Haysam corrected the Pythagorean misconception about vision of many opticians before him and said: "Optical image is formed with the help of light rays radiating from visible objects" [5].

Artists and architects began to refer to Vitello's book only in the middle of the 15th century, that is, when they began to create paintings and architectural buildings that could meet the grandiose requirements of the European Renaissance. True, Vitello did not see perspective as the representation of three-dimensional space on flat, concave or convex surfaces. But artists understood exactly this meaning in this charming word.

Italian painter Pero della Francesca (1416 – 1496) in his book On Perspective in Painting advanced the classic idea that an image is the line intersecting the central image

plane of the cone of one eye's view of a landscape.

...We, engineering graphics experts, use the word "perspective" at every step today, its emergence and its firm decision in the lexicon of our science, while we use the phrase "landscape plane" when it is necessary to say "perspective image plane" If we remember that Haysam's "Kitab al-Manozir" is named after him, we will greatly rejoice the soul of our great ancestor**.**

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