

Alhazen: The First Theoretical Scientist

Alhazen was the earliest to discover that a hypothesis must be proved by experiments based on confirmable evidence or mathematical evidence.

- ❖ Full name: **Abū-Alī al-Hasan ibn al-Hasan ibn al-Haytham**
- ❖ Born in: **Basra, Mesopotamia (Iraq) (965-1039 CE)**.



Significant Contributions

- ❖ In the fields of astronomy, mathematics, medicine, and most significantly, **optics**.
- ❖ His work in optics irrefutably proved that **vision is a function of external light rays entering the human eye**; his rigorous and quantitative approach formed the basis of the modern experimental method in science.
- ❖ One of Alhazen's most significant creations was a seven-volume work on optics titled ***Kitab al-Manazir*** (later translated to Latin as ***Opticae Thesaurus Alhazeni – Alhazen's Book of Optics***).

One of the first ideas regarding how human vision works was from the **Greek philosopher Empedocles** around 450 BCE: “**Greek goddess Aphrodite had lit a fire in the human eye, and vision was possible because light rays from this fire emanated from the eye illuminating objects around us**”. This idea remain persistent until around 1,000 CE when the Persian scientist Alhazen advanced our knowledge of the nature of light and, in so doing, developed a new and more rigorous approach to scientific research.

Experiment:

Alhazen stood in a darkened room with a small hole in one wall. Outside of the room, he hung two lanterns at different heights. He observed that the light from each lantern illuminated a different spot in the room, and each lighted spot formed a direct line with the hole and one of the lanterns outside the room. He also found that covering a lantern caused the spot it illuminated to darken, and exposing the lantern caused the spot to reappear. **Thus, Alhazen provided some of the first experimental evidence that light does not emanate from the human eye but rather is emitted by certain objects (like lanterns) and travels from these objects in straight lines.**

Significance:

- Alhazen's experiment may seem simplistic today, but his methodology was ground-breaking: he developed a **hypothesis** based on **observations** of physical relationships (that light comes from objects), and then designed an experiment to test that hypothesis.
- Despite the simplicity of the method, Alhazen's experiment was a critical step in refuting the long-standing theory that light emanated from the human eye, and it was a major event in the development of modern scientific research methodology. Later scientists built upon Alhazen's work.

Works Cited:

"Ibn Al-Haytham and the Legacy of Arabic Optics". 2015 INTERNATIONAL YEAR OF LIGHT. 2015, Jim Al-Khalili (February 2015). "In retrospect: Book of Optics" Nature. Nature Publishing Group. Retrieved 2015-03-13.

Anthony Carpi, Ph.D., Anne E. Egger, Ph.D. "Alhazen: Early experiments on light" Visionlearning Vol. HID (4), 2009. <http://www.visionlearning.com/en/library/Process-of-Science/49/Experimentation-in-Scientific-Research/150>