

Analysis of the influence of hadith methodology in the scientific method development: A study of the biography and writings of Ibn al-Haytham

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Abstract

This study explores the influence of Hadith methodology on the science development through the study of the biography and works of Ibn al-Haytham. It aims to identify the scientific methodologies used in Hadith studies and analyze their relevance and impact on Ibn al-Haytham's scientific approach. The method used in this research was by examining comparative study of both methods with the analysis regarding timeline background from historical sources and the books of Ibn al-Haytham. The study revealed significant parallels between the rigorous validation processes in Hadith methodology and the methods employed by Ibn al-Haytham in his scientific inquiries. The findings suggest that the principles of verification and validation in Hadith studies may have influenced the development of systematic scientific methods in science particularly in the works of Ibn al-Haytham. This research contributes to a deeper understanding of the interconnectedness between Islamic religious scholarship and the evolution of scientific thoughts.

Keywords: Hadith methodology; Ibn al-Haytham; scientific development; validation

1. Introduction

Hadith and modern science are often considered to have very different or unrelated views. People often cite contradictions between both on various topics, leading to the rejection of their authority by some communities (Faizin, 2015). However, Ibn Taymiyya that wrote the book *Daar at-Ta'arudh bainal 'Aqli wan Naqli* stated that there is no contradiction between valid reason and valid revelations. This implies that there is no contradiction between valid results of scientific methods and revelations, such as valid hadiths (Hoover, 2022). Furthermore, there are possibilities that both hadith method and scientific method share similarities, particularly in their goal of obtaining valid results and the immense efforts required in their methods.

Modern science, based upon the scientific method, developed around the same time and place as the development of hadith methodology. The scientific method, both experimental and observational one, was first introduced by Ibn al-Haytham, who was born in 965 AD and well-educated in Basra, modern-day Iraq (Al-Qifithi, 2005). His well-known publication, Book of Optics, around 1014 AD, along with his other books, had a significant influence on many scientists in Europe before and even after the Renaissance period (El Bizri, 2018). Some scholars have noted him as an important transition point in the modern science development from ancient Greek philosophies to a scientific method based on valid proofs and

replicable experiments (Ghassemi & Brown, 2020).

The Hadith methodology was fully developed and published between 855-970 AD in Baghdad, modern-day Iraq. This period saw the significant contributions of scholars of Hadith such as Ahmad (d. 855 AD), Ali Al-Madini (d. 848 AD), Bukhari (d. 870 AD), Muslim (d. 875 AD), and many others. A comprehensive methodology was later compiled by Romahurmuzzy (d. 970 AD) in a single book entitled *Muhaddithul Fashl bainar Rawi wal Wa'i* (Alwy & Najwah, 2021), (Al-Jarbu'i, 2023).

The Hadith method may be considered as the progenitor of systematic truth investigation for involving a comprehensive framework to determine validity or invalidity through qualitative analysis (Al-Mu'tamadah, 2019). This analysis categorizes reliability into classifications such as strong, fair, weak, very weak, or fabricated (Al-Jarbu'i, 2023). Later, the scientific method emerged, primarily focused on investigating current theories or hypotheses using an inductive approach. It aims to achieve precise conclusions through both quantitative and qualitative analyses (Ghassemi & Brown, 2020).

The similarities and relationships between Hadith methodology and the scientific method remain underexplored. Further research on this topic presents a valuable and intriguing approach, offering the potential to significantly contribute to understanding the early history of modern science. Such research could help to bridge the gap between Islamic Sciences and Modern Sciences, uncovering hidden connections and fostering a deeper integration of knowledge. Moreover, it provides an opportunity to reassess and refine the foundational concepts of modern science, ensuring its interpretations not

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excessively overlapping with areas such as metaphysics.

Recent Western publicized research on the Hadith methodology has resulted in significant appreciation and a reassessment of earlier skepticism expressed by Orientalists, who had criticized the method without full understanding or objectivity (Alshahri, 2011). This method might be favorably compared to historical research, leading to the recognition of as a credible resource for historical study. Furthermore, it prompts further investigation into the role of the Hadith method in other scientific disciplines and its potential contribution to the development of early scientific methodologies.

This research aims to investigate the intersection of the Hadith methodology and the scientific method through a study of Ibn Al-Haytham with a focus on his biography and writings.

The Hadith method refers to a rigorous validation process for Hadiths, involving an in-depth analytical research into their chains of transmission as well as objective, critical analysis of their content. The Hadith method examined in this research encompassed the extensive approaches used by early Hadith scholars, both prior to and during the lifetime of Ibn Al-Haytham. This included the methodologies of renowned and prominent Hadith compilers, such as Ahmad, Bukhari, Muslim, at-Tirmizi, and Abu Daud. Their methods were later compiled into a single scientific discipline known as Hadith Sciences during the time of Romahurmuzzy, Ad-Daruquthni, and Al-Hakim, all of whom lived before and during the era of Ibn Al-Haytham.

This research also included an analysis of the principal and ethical aspects upheld by Hadith scholars in their research. Furthermore, it investigated the similarities in the theological backgrounds of Ibn Al-Haytham and Hadith scholars, which may have contributed to the significance of this methodology.

The scientific method is a systematic and logical process utilized by scientists to explore observations, address questions, and solve problems. It encompasses several key steps: observation, questioning, hypothesis formulation, experimentation, analysis, conclusion, and reporting findings. Ibn al-Haytham's Book of Optics is widely recognized as one of the earliest works to fully embody all the inquiries of the scientific method. Furthermore, the scientific method referring to this research is focused on scientific one used by Ibn al-Haytham.

2. Methodology

This research employed a hermeneutic approach to interpret primary and secondary source texts within a more contextually appropriate framework. Through this method, the study derived some new insights and explored the potential relationships between different fields of knowledge.

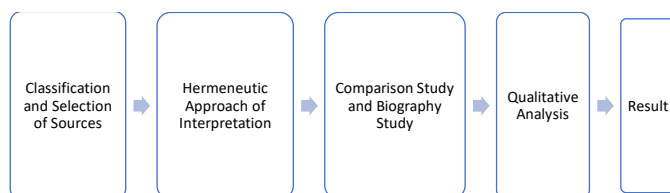


Fig. 1. The research design chart

The research used an analytical approach to obtain qualitative results on the significance of Hadith method on Ibn al-Haytham's scientific method. It began with a comparative study of the similarities and differences between both methods, a biographical study of Ibn al-Haytham, a descriptive study of

his writings, and an interdisciplinary approach by citing a number of commentaries from both Hadith and science experts.

The research used both primary and secondary resources with strict inclusion and exclusion criteria. The primary resources included the following writings of Ibn al-Haytham.

- The Optics of Ibn al-Haytham, the translation of book *Al-Manazhir parts 1-3* written by Ibn al-Haytham (Sabra, 1989).
- *Thamarah Al-Hikmah* book written by Ibn al-Haytham validated by Ammar Jam'i Ath-Thalibi (Ath-Thalibi, 1998).
- Treatise on the Nature of the Marks on the Surface of the Moon the translation of Ibn al-Haytham's book entitled *Maqalah fil Atsar Az-Zahir fi Wajhil Qamar* (Ghassemi & Brown, 2020).
- The Celestial Kinematics of Ibn al-Haytham, the translation of Ibn al-Haytham's book entitled *Maqalah fii Harakaatis Samaa'* (Rashed & Field, 2019).
- *Shukuk 'alaa Bathalamiy* book written by Ibn al-Haytham (al-Haitsam, 1971).
- Two primary sources of Ibn al-Haytham's Biography written in Arabic by Al-Qifti (d. 1153 AC) entitled *Ikhbaarul 'Ulamaa' bi Akhbaaril Hukamaa'* and Arabic book of Ibn Abi Usaibi'a (d. 1270 AC) entitled *'Uyunul Anbaa' fii Thabaqaatil Aththibaa'* (Al-Qifithi, 2005), (Ushaibi'ah, 1996).

The secondary sources were focused on Hadith methodology and historical backgrounds included:

- *Shahih Muslim* (An-Naisaburi, 1955)
- *Bidayah wa Nihayah* (As-Sulami, 2004)
- *Siyar A'lam an-Nubala* (Adz-Dzahabi, 1985)
- *Taqrib Musthalah Hadith* (Al-Jarbu'i, 2023)
- *Manahijul Bahth* (Al-Ahmadi, et al., 2020)
- *Ta'liqaat Atsariyyah 'alaa Manzumah Baiquniyyah* (Al-Halabi, 2019)

The research analysis was based on qualitative measurement of several parameters, including similarities, compatibilities, and relationships, as follows:

- Similarities in methodology
- Similarities in time background
- Similarities in place background
- Relationship of Ibn al-Haytham with the scholars of Hadith and their methods
- Relationship of Ibn al-Haytham with the knowledges of Hadith and its method
- Relationship of the writings of Ibn al-Haytham and Hadith's Method or scholars of Hadith

From the six parameters above, we then measured each result as strong, fair, or weak and used this table to obtain the qualitative significances

3. Results and Discussion

3.1. Object's differences and compatibilities

The differences between Hadith methodology and modern science's method lie in the objects of their study. Hadith methodology uses a retrospective study to validate each chain

and its intact connection back to the Prophet. In contrast, modern science, based on the scientific method, uses a prospective approach achieved through both experiments and controlled observations. The main topics of Hadith also commonly differ from those as discussed in modern science with very little intersection that can be compromised. These differences in objects and topics, in fact, accommodate the compatibilities of each discipline.

Ibn al-Haytham distinguished Natural Sciences and Islamic Sciences, noting that Natural Sciences focus on sensed objects in the universe, while Islamic Sciences pertain to metaphysics and unseen objects, such as God, who is above the heavens, and His Divine Attributes and Acts (Ath-Thalibi, 1998). He also warned scholars to speak only about topics within their specialization unless they are also specialized in other topics (Ishaq & Daud, 2017). He emphasized that the sciences of mathematics, logic, and reasoning are meant to aid in understanding the facts of natural sciences, not to defy the senses or prioritize reason above the senses. Additionally, he stated that the purpose of understanding sciences is to establish knowledge of God and His Perfect Knowledge, Acts, Capabilities, and Wisdom (Ath-Thalibi, 1998), which differs from some atheist scientists today who are denying the God existence.

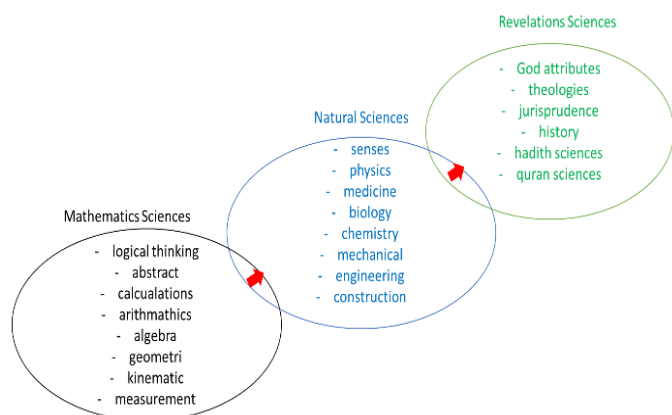


Fig. 2. The divisions of knowledge based on Ibn al-Haytham's book *Thamarah Al-Hikmah*

3.2. Similarities of hadith methodology and scientific method

Hadiths, for over a thousand years, have accommodated a scientific approach through several steps of deep research on their validity. These steps include:

- Data collection method, including total sampling with inclusion and exclusion criteria, clarification, and validation.
- Transmitter assessment method, including testing, observation, expert assessments, classification, and meta-analysis.
- Method in analyzing the validity of the hadiths chains, according to the strength of reliability and accuracy of transmitters, the continuity of chains of transmissions, error and hidden weakness checking such as *'ilal* (hidden error), *syadz* (contradiction), *idtirab* (inconsistency), or *tadlis* (concealment).
- Principles and ethics, such as caution, inductiveness, reliance on proof and valid sources, honesty, hard work, and accountability (Al-Jarbu'i, 2023), (Al-Halabi, 2019), (Al-Mu'tamad, 2019).

Table 1. Similarities between hadith methodology and the scientific method

Descriptions	Scientific Method	Hadith Methodology	Similarities
Data Collection	massive experiments and controlled observations	massive collections with various tests and observations on the transmitters of hadith and their hadiths	Fair
Data Analysis	mostly in quantitative analysis (on measurable variables) qualitative analysis (on non-measurable variables) sometimes descriptive	qualitative analysis (on hadith validity) descriptive (on transmitters of reliability)	Fair
Conclusion	Inductive	inductive	strong
Error checking	bias deviation standard other factors psychological aspect	<i>'ilal</i> (hidden error) <i>tadlis</i> (concealment) <i>idtirab</i> (inconsistent) <i>syadz</i> (contradictory)	strong
Objectivity	objective avoid bias	<i>al-'adalah</i> (objective) avoid bias	strong
Principles and Ethics	- Being cautious - relying on reliable and repeatable proves - truth and validity - hard work - honest - accountable	- <i>wara'</i> (cautious) - relying on valid sources and transmissions - truth and validity - hard work - honest - accountable	strong
Scientific publication and systematic writing	- introduction (background, purpose) - methods - results - analysis of the results and discussions - conclusion, limitations, suggestion	- introduction (background, purpose) - methods of kitab - contents of hadiths - analysis on its validity of hadith - conclusion of each validity and lessons	strong

3.3. Study of Ibn al-Haytham biography, time and place compatibility

His name is Al-Hasan ibn Al-Hasan ibn al-Haytham (965-1040 AD) with *Kunya* name Abu Ali. Well known author name in Europe as a bit different translation these are Alhazen or Alhasen or Alhacen.

He was born in Basra, one of the cities in modern-day Iraq, during the time of the Abbasid Caliphates. He began his youth studying various Islamic disciplines to the extent that he understood the differences between jurisprudences on Fiqh and theologies in Muslim communities (Al-Qifthi, 2005). According to his biography written by Ibn Abi Usaibi'a (d. 1270 AD), he was known for writing several books and treatises that corrected and refuted the Mu'tazilah, Ahli Kalam, and

philosophers of his time on the topics of metaphysics and natural sciences (Taimiyyah, 1985).

Some modern historians viewed him as Ash'ari in view of his refutations of Mu'tazilah. In fact, the scholars of Hadith were much more opposed to Mu'tazilah. During his lifetime, Ash'ari theology was not fully established or dominant until the reign of Prime Minister Nizamul Mulk, who was born in 1018 AD after Ibn al-Haytham had moved to Egypt (Ash-Shallabi, 2016). Ahlul Hadith were still dominant and opposed Mu'tazilah, which had been adopted as the official theology of the Abbasid Caliphate during Al-Barbahari's time (d. 941 AD). Ash-Shobuni (983-1057 AD) wrote the book *Aqidatus Salaf wa Ashabul Hadith*, containing the agreements among scholars of Hadith on theological topics that are very different from modern-day Ash'ari theology (Adz-Dzahabi, 1985).

Further studies on his writings suggest that he adhered more to *Ahlul Hadith*'s theology than others. He believed in God's personal attributes and action attributes, God's place in outer space (above the sky), and his scientific methods (Ath-Thalibi, 1998). Even though he was impressed by Aristotle's books on natural science and Galen's book on medicine, he did not follow them in metaphysics and even corrected them on various topics in natural sciences and mathematics. This was contradicting with Islamic thinkers who followed every Greek philosopher's statement as truth.

In his book, translated as *Celestial Kinematics*, he wrote that every scientist or engineer should follow no Greek philosophers in every statement and should not view them like the Prophets of God to be followed without needing a proof or reason (Ishaq & Daud, 2017). His books that corrected and criticized Greek philosophers were controversial in his era, possibly leading to isolation and refutations from others, such as the physician Abd Lathif Al-Baghdadi (d. 1231 AD), who defended Aristotle's concept of place (El-Bizri, 2007).

Despite the popularity of his translated books in Europe for centuries, he was not well recognized among Muslim thinkers even after his era (Ghassemi & Brown, 2020). The only well-known Arabic book that cited his works was written by Kamaluddin Al-Farisi (1267-1320 AD), summarizing Ibn al-Haytham's *Al-Manazhir*, with some additions that successfully explained the refraction of light and rainbow phenomena. This resonated with books written by European scientists inspired by the translation of Ibn al-Haytham's works (El Bizri, 2018). His another book, translated as *The Doubt of Ptolemy*, was also a significant work challenging the Ptolemy's unrivaled geocentric model of the solar system, later influencing Copernicus's heliocentric model (El Bizri, 2018).

Since Hadith methodology was well-developed before Ibn al-Haytham developed his own scientific method, later followed by European scientists centuries later, there was a strong possibility that it influenced the development of Ibn al-Haytham's scientific method from the time background.

From a geographical perspective, Ibn al-Haytham was known to have moved from Basra to several cities, such as Baghdad, Shams, Egypt, and Andalusia, indicating that he may have met several Hadith scholars. In Basra, he might have met the students of Abu Dawud as-Sijistani, such as Abu Amr Ahmad bin Ali bin Hasan al-Bashri, the transmitter of *Sunan Abu Dawud*, Muhammad bin Ahmad bin Ya'qub Al-Mutawasi al-Bashri, the transmitter of the book *Al-Qadr* from Abu Dawud, and Muhammad bin Roja' Al-Bashri. In Baghdad, he might have met the famous scholar of Hadith, ad-Daruquthni (d. 996 AD), and his students, such as al-Hakim an-Naisaburi (d. 1014 AD), who wrote the famous book of Hadith *Mustadrak*

'alash Shahihain and *Al-Madkhal ila 'ilmis Shahih*, and Abu Nu'aim (d. 1038 AD) (Adz-Dzahabi, 1985).

Ibn al-Haytham moved to Egypt in 992 AD and wrote his famous book there after being imprisoned for stopping the construction of the Nile River Dam due to its impossibility at that time. After being freed from the Fatimid Dynasty's imprisonment, he taught at Al-Azhar University and later traveled to Andalusia. In this place, he might have met Abul Qasim Az-Zahrawi (Albucasis), the author of the famous medicine and surgery book *At-Tasrif*, and Ibn Abdil Bar, a well-known Maliki scholar of Hadith (Adz-Dzahabi, 1985).

3.4. Relationship in Ibn al-Haytham's writings

The following relationships between Ibn al-Haytham and Scholars of Hadith may contribute the significance of their influence on him.

- Ibn al-Haytham followed the Scholars of Hadith's Theology in his affirmation of attributes of God. He said, "And *'Ilmu Ilahi*, which knowledge about Him who at outer of the skies, *Al-Fa'il Al-Awwal, Mubdi-ul Mabadi'*, and *Awwalul Awaail*, He is Allah, The Highest and (knowledges) of His Deserving Attributes from *Dzatiyyah* and *Fi'liyyah* (Ath-Thalibi, 1998).
- Ibn al-Haytham had several writings, the title of which contain refutation to Mu'tazilah, Ahli Kalam, and some philosophers. This indicate that his position in theology was similar to the scholars of hadith as mentioned below.
 - *Ar-Radd 'alal Mu'tazilah fi ra'yihim al-Wa'id* (The refutation of the Mu'tazilah regarding their view on the promise of punishment).
 - *Maqalah fii annad daliilil ladzii yastadillu bihi mutakallimu fi huduutsil 'alam daliil faasid wal istidlaali 'alaa huduutsil 'aalam bil burhaanil idhtiraari wal qiyaasil haqiqi* (A treatise on the invalidity of the evidence used by theologians to prove the occurrence of the universe, and the demonstration of the occurrence of the universe through necessary proof and true analogy).
 - *Risalah fii ar-Radd 'alal Mu'tazilah ra'yahum fii huduutsi sifaatillah tabaaraka wa ta'aalaa* (A discourse refuting the Mu'tazilah's view on the occurrence of the attributes of Allah, Blessed and Exalted).
 - *Risalah fi buthlaani maa yaraahul mutakallimuuna min annallaaha lam yazal ghaira faa'il tsumma fa'al* (A discourse on the invalidity of the theologians' opinion that Allah is eternally non-doing action and then becomes doing action).
 - *Maqalah fir radd 'alaa Abi Haasyim Ra-iisil Mu'tazilah maa takallama bihi 'alaa jawaami'i kitabis sama' wal 'aalami li aristhuuthaaliis* (A treatise refuting Abu Hashim, the leader of the Mu'tazilah, on his discussion of the contents of Aristotle's book on the heavens and the universe).
 - *Naqdhu jawaabi mas-alatin su-ila 'anhaa ba'dhu mu'tazilati bil bashrah* (A critique of the answer to a question posed to some Mu'tazilah theologians in Basrah).
 - *Maqalah fii anna faa'ilu hadzal 'aalam innamaa yu'lamu dzaatuhi min jihati fi'lih* (A treatise asserting that the Creator of this universe can only be known through His Actions).
 - *Jawaabu Qouli li ba'dhil manthiqiyin fii ma'aani khaalafa fiihaa min umuuril thabi'iyah* (A response to the

statements of some logicians concerning meanings in which they contradicted the matters of natural science).

- *Kitaab fii itsbaatin nubuwwaati wa iidhoohi fasaadi ra'yilladzii ya'taqiduuna buthlaanihaa wa dzikrul al-farqa bainan nabiy wal mutanabbi* (A book on affirming prophethood, clarifying the invalidity of the opinion held by those who deny it, and discussing the differences between a prophet and a false claimant).
- *Ibanatul ghalath mimman qadha annallaha lam yazal ghaira aa'il min fi'lin* (The clarification of the error made by those who judged that Allah is eternally non-active in actions) (Ushaibi'ah, 1996).
- Ibn al-Haytham suggested his readers to be critical of any non-revelatory sources and warned them against fanatically following anyone but the Prophets (Ishaq & Daud, 2017). This confirms that his method in religion is similar to the scholars of Hadith.
- Ibn al-Haytham borrowed various Arabic words commonly used by the scholars of hadith such as *As-habul Hadith*, *al-'Ilal* and *istinad* on topics actually unrelated to hadith. He said, "...they followed the philosophers in every statement without questioning and *istinad* (rely) it to proves. It is only what to do *As-habul Hadith* to the Prophets peace upon them and not what to do the students of mathematics to the philosophers" (Ishaq & Daud, 2017). He also said about the definition of Natural Science, "*Ilm ath-Thabi'i* is the knowledges of objects that can be sensed, their properties, their *ilal* (causes), and their components' (Ath-Thalibi, 1998).
- Ibn al-Haytham did not use mathematics, logics, or reasonings to deny or reinterpret the authority of revelations on the metaphysic objects but used it to help in explaining the natural phenomena as the prove of God's perfection in knowledges, wisdom, and capability.

Table 2. Results of six parameters on similarities and relationship

Parameters	Results
Similarities of both methods	strong
Similarities in time background	strong
Similarities in place background	strong
Average Similarities Parameters	strong
Relationship of Ibn al-Haytham with scholars of Hadith and their method	fair
Relationship of Ibn al-Haytham with the knowledges of Hadith and its method	weak
Relationship in the writings of Ibn al-Haytham with Hadith's Method or scholars of Hadith	strong
Average Relationship Parameters	fair

Table 3. Qualitative analysis using similarities, compatibilities, and relationship parameters

Significances	Average Relationships Parameters			
		strong	Fair	weak
Average Similarities Parameters	Strong	very strong	strong	fair
	Fair	strong	Fair	weak
	weak	fair	Weak	very weak

The overall findings of this study demonstrated strong similarities and meaningful relationships, leading to the

conclusion that the Hadith methodology has a substantial influence on the scientific method development, as supported by studies concerning Ibn al-Haytham.

3.5. Discussion

3.5.1. Theoretical implication

This research contributes to the academic understanding of the intersection between religious scholarship and scientific methodology. By identifying parallels between the rigorous validation processes inherent in Hadith methodology and the systematic approach used by Ibn al-Haytham in his scientific inquiries, the study underscored the influence of Islamic intellectual traditions on the evolution of modern scientific thought. These findings provide a robust foundation for future interdisciplinary research, exploring how religious methodologies have historically informed scientific paradigms and continued to inspire novel approaches in the philosophy of science.

3.5.2. Practical implication

The findings of this study hold potential applications in several fields:

1. Educational frameworks

Integrating principles derived from Hadith methodology into educational curricula can foster critical thinking and analytical skills. Such integration may be particularly impactful in cross-disciplinary studies, bridging history, science, and religion.

2. Research methodology enhancement

The validation frameworks used in Hadith studies may offer several innovative approaches for improving reliability, accountability, ethical rigor in scientific practices and become a new insight to solve any recent scientific problems.

3. Promoting islamic intellectual heritage

Demonstrating the historical contribution of Islamic scholars to the development of scientific methodologies can enhance appreciation for Islamic scholarship and support efforts in Da'wah, showcasing the rich intellectual legacy of Islamic civilization.

4. Conclusions

The study revealed a number of significant similarities between Hadith methodology and the methods employed by Ibn al-Haytham in his scientific inquiries. Further analysis of his biography and writings suggests a strong relationship between Ibn al-Haytham and the scholars of Hadith. The significant similarities in methodology and the strong relationship indicate that Hadith methodology has a substantial influence on the development of systematic scientific methods, particularly in the works of Ibn al-Haytham. This research contributes to a deeper understanding of the interconnectedness between Islamic studies and the evolution of scientific methods.

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