RESEARCH ARTICLE

Terminological Dictionaries between the Integration of Sciences and Harmony of Arts: Al-Khawarizmi's Mafatih al-Uloom (387 AH) and Al-Qannuji's Abjad al-Uloom (1307 AH) as a Model

Abdennour Hamidi

Dr.

Centre for Scientific and Technical Research on Arabic Language Development - Algeria (CRSTDLA) - Tlemcen Unit

Algeria

Email: a.hamidi@crstdla.dz

Souad Belabbes

Dr.

Centre for Scientific and Technical Research on Arabic Language Development - Algeria (CRSTDLA) - Tlemcen Unit

Algeria

Email: s.belabbes@crstdla.dz

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Abstract

This research explores cognitive integration in Arabic terminological dictionaries by examining their structure, compilation methods, and intellectual aims. It argues that Arabic dictionaries were not solely products of lexicography but served as cognitive spaces uniting various sciences and arts. Focusing on encyclopedic terminological dictionaries, the study analyzes how scientific terms were systematized within a unified framework. Using a descriptive-analytical approach supported by historical and comparative methods, it reveals that Arab scholars integrated disciplines rather than separating them, as seen in Mafatih al-Uloom by Al-Khawarizmi and Abjad al-Uloom by Al-Qannuji. These works encompass terms from both Arab and non-Arab sciences, showcasing the Arabic language's adaptability in expressing diverse fields of knowledge.

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Introduction:

Cognitive integration among the sciences is one of the most prominent features of Arab-Islamic thought. "It has existed since the inception of knowledge and sciences themselves, as knowledge does not arise in isolation from others. Instead, sciences cooperate, complement, and support each other until they form a cultural and civilizational fabric for a people or for all of humanity." It has been one of the major foundations of Islamic civilization and the flourishing of its sciences. While Islamic sciences are known for their openness and interconnection, lexicography was not exempt from this trend. In fact, it clearly embodied this trend through what are known as "terminological dictionaries," which focused on documenting scientific concepts and defining their terms within an encyclopedic vision that reflects a deep awareness of the unity and integration of knowledge.

This study aims to highlight the features of this integration in two prominent examples of encyclopedic terminological dictionaries in Arab heritage: *Mafatih al-Uloom* by Muhammad ibn Ahmad Al-Khawarizmi (d. 387 AH) and *Abjad al-Uloom* by Sadiq Hasan Khan Al-Qannuji (d. 1307 AH). The research seeks to analyze the methodology of compilation in these two dictionaries, examine their cognitive and terminological structure, and show the relationship between the classification of sciences and lexicographic production in the context of knowledge creation.

The study adopts a descriptive-analytical approach, supported by historical and comparative methods, to reveal the cognitive and methodological dimensions upon which these works were based, reflecting the brilliance of the Arab intellect in combining scientific accuracy and encyclopedic comprehensiveness.

First: Cognitive Integration in Arab and Islamic Linguistic Thought:

1. The Encyclopedic Trend Among Early Arab Scholars:

One scholar argues that certain terms occupy a prominent place in intellectual and cultural writings, "they are commonly used without clearly defining their meanings. Therefore, it is not surprising to find a term used with different and sometimes contradictory meanings. This is likely the case with the term 'cognitive integration.' The term is often used to describe someone as being encyclopedic in their knowledge and culture because they are familiar with many sciences, even if their familiarity is from a general cultural perspective rather than specialized knowledge. In this context, attention is drawn to some Muslim scholars who exhibited cognitive integration, meaning they were encyclopedic in language, literature, jurisprudence, Qur'anic sciences, Hadith sciences, history, and possibly astronomy, medicine, or mathematics. For example, Imam Al-Tabari was a commentator, historian, jurist, linguist, and poet. Ibn Khaldun, although primarily a political adventurer, was known as a historian, chief judge of the Maliki school in Egypt, and many attribute to him innovations in social sciences, economics, and education. Ibn Sina was a philosopher and physician, while Ibn Rushd was a jurist, theologian, physician, and philosopher, and Ibn Taymiyyah wrote extensively on jurisprudence, theology, Hadith, Sufism, and logic."

Despite the notable characteristic of Muslim scholars in classifying multiple disciplines, this was not exclusive to them alone. "This phenomenon was also known among ancient scholars and philosophers in other civilizations, particularly in Greek civilization. Perhaps the phenomenon of specialization in a single science and dedicating oneself to it is a modern development in human history due to the vast expansion of human knowledge, making it difficult for a single scholar to specialize in more than one science. In fact, a single science has now split into subfields that a scholar may hardly master one of them."

1.1. Prominent Figures in Arabic Cognitive Integration in Compilation:

Some researchers argue that Arabic heritage included early encyclopedic works, exemplified by, but not limited to, *Ayoun al-Akhbar* by Ibn Qutaybah (d. 276 AH/889 AD), which collected various sciences, the works of Al-Jahiz (d. 255 AH/868 AD) such as *Kitab al-Hayawan* (The Book of Animals), which included reports on animals, their habits, and discussed philosophical and scientific topics such as generation and corruption, elements and properties, and his famous *Al-Bayan wa al-Tabyin* (The Book of Eloquence), which presented selected prose and poetry, outlining the foundations of rhetoric and the philosophy of language, *Mafatih al-Uloom* by Al-Khawarizmi (d. 307 AH), and the contributions of Abu al-Hasan Al-Masudi in the 10th century (d. 346 AH/957 AD). His works remain immortal in the heritage of humanity, including vast collections of geographical and historical facts, such as *Muruj al-Dhahab wa Ma'adin al-Jawahir* (The Meadows of Gold and Mines of Gems), which included thirty volumes, though only the first part has survived. In this work, Al-Masudi discusses the shape of the Earth, its cities, mountains, rivers, minerals, and the division of regions and the diversity of peoples.

1.2. The Mamluk Period: The Era of Encyclopedic Compilation Among Arabs:

The Mamluk era in Egypt and the Levant (1250-1517 AD / 648-923 AH) is described as the golden age of Arabic encyclopedic literature. During this period, encyclopedias were widely written by prominent scholars close to the royal court, such as Shihab al-Din al-Nuwairi, Ibn Fadlallah al-Omari, Abu al-Abbas Ahmad ibn Ali al-Qalqashandi, Jamal al-Din al-Wattawat, and others.

The intellectual classes in the Mamluk era were known for their scientific traditions, which blended diverse cultures and vast knowledge. Scholars of that time were famous for their encyclopedic knowledge and fluency in various fields. The Mamluk encyclopedias reflected this spirit, representing a return to older Arab and Greek traditions.

Abu al-Abbas al-Qalqashandi (d. 821 AH / 1418 AD), who served as the head of the Diwan al-Insha during the reign of Mamluk Sultan al-Zahir Barquq, wrote his encyclopedic work "Subh al-A'sha fi Sana'at al-Insha," which consists of fourteen volumes. It covers topics and chapters on systems of government, administration, politics, libraries, traditions and clothing in the Arab East, the history of diwan offices and ministries, the arts of writing, military clothing and weapons, sports, and various aspects of Arab society, as well as calligraphy and its tools.

Al-Qalqashandi's encyclopedia was considered a comprehensive guide to the art of official state writing, correspondence, and written communication. Parts of it were translated into European languages. The increase in reading and writing among the "middle classes" in Mamluk society led to a vibrant book market, providing alternatives for researchers to earn a living through writing and authorship.

In this context, Dr. Mustafa al-Shakka comments that the emergence of these scientific treasures in the Mamluk era is a strong and clear response to those who claim—perhaps without intent or consideration—that it was a period of scientific backwardness and literary decline. This is due to their disregard for these abundant major scientific works, which one of them could replace a hundred books, and because they fail to take into account the nature, precision, and significance of the Mamluk era, which is described as weak and deteriorated, a part of the vast Islamic world that had just emerged from the harsh Mongol invasion, exhausted and wounded, stripped of its intellectual treasures thrown into the Tigris River, which were a testament to the greatest crime against human knowledge throughout history. In addition, the Mamluk era was a period of generosity, construction, and innovation. Perhaps one of its most brilliant signs was the emergence of the great scholar, thinker, historian, philosopher, and politician, Ibn Khaldun.

2. Cognitive Integration - Terminology and Concepts:

The scholar Abdelkader Hamdi believes that one of the most important principles that arose from the Arab classification of sciences was the general acknowledgment of the interconnection and relationship between sciences, either in their subjects or in their methods of acquisition and points of view. In this context, there was an emphasis on the necessity of following a certain system in the arrangement and advancement of knowledge and learning, in order to achieve the sound educational/learning dimension. As a result of Muslim scholars' recognition of the interconnection of sciences, the idea of their cognitive integration was proposed. This principle suggests that all sciences—despite their differences in essence, subjects, methodologies, and immediate goals—are interrelated and cooperative. They are connected and integrated with one another, even though apparent differences may arise. This is because some sciences lead to others, and the results of some provide the premises for other sciences. Their subjects may share completely or partially, making them all, despite their differences, interconnected, with some serving as a means for others.

2.1. The Concept of Cognitive Integration:

Khadija al-Hashimi quotes a scholar who states that the term "cognitive integration" has been a subject of philosophical debate, leading to an issue with its operational concept. However, the conclusion of this debate affirmed the inevitability of the integration between sciences and knowledge, as it is a result of the diversity and differences in life in general. It is a principle and a persistent pattern in the purposes of religion and ethics. Cognitive integration exists and is embodied between the unseen and the visible, the body and the soul, transmission and reason, speech and action, this world and the afterlife, perception and application, the individual and the community, and so on.

Abd al-Karim Akkawi argues that the scientific specialization, which is a feature of the present era, does not mean that the scholar remains confined to their specific field without regard for other fields. Rather, it means having a deep understanding of one domain, without bias, while linking this understanding to a broad circle of general scientific culture, noting the boundaries and intersections between their specialization and others. The more a specialist acquires this general culture, the deeper their expertise in their own specialization. Thus, collaboration among scholars is essential for serious, integrated scientific study, and so is the precise scientific specialization that has clearly become a feature of contemporary scientific life.

Cognitive integration can also be defined briefly as the scientific, integrated view of existence and self, achieved by applying the Islamic perspective in all fields of knowledge, whether natural sciences, social sciences, humanities, or religious sciences.

2.2. On Integration and Encyclopedic Knowledge:

Some scholars argue that one of the concepts that intersects with the concept of cognitive integration is that integration must point to encyclopedism, and that specialization goes in an opposite direction to the idea of integration. Here, it is important to emphasize the significance of both encyclopedism and specialization. Encyclopedism suggests a Muslim's mastery over the sciences of Islam, enabling them to achieve the goal of life, attain the desired level of knowledge, and benefit from all the elements of the universe that have been made subservient to them. If knowledge requires another science to complement it, it is obligatory for the seeker of knowledge to fully engage with it to grasp its dimensions. This is similar to the religious sciences, where a specialist in tafseer (Quranic exegesis) cannot be content with only their knowledge to reach the highest levels of understanding, but must also study fiqh (jurisprudence), its principles, rhetoric, language, Qur'anic sciences, and recitations, among others. In this way, knowledge in all other fields also requires a comprehensive approach. This necessitates the design of interconnected academic frameworks, explaining the relationships between sciences and their roles, not just a mere abstract connection.

Thus, we find that there is cognitive integration both within a specialization and across multiple specializations.

From this, it can be concluded that a scholar or student of knowledge must embrace different branches of knowledge and delve into them according to the needs of their specialization in order to enhance their understanding and broaden their perspective of interconnected sciences.

2..3 The Importance of Cognitive Integration:

Cognitive integration is a methodological intellectual issue, as it pertains to intellectual activity, research practices, and how ideas are approached. It has two dimensions: productive and consumptive. To illustrate the position and importance of integration within the scientific work, Buir classified scientific work into four areas: the first is discovery, corresponding to the intellectual efforts in research within specific fields of knowledge; the second is application, reflecting on the practical use of discovered knowledge; the third is teaching, which involves transmitting knowledge across generations; and the fourth is integration, which combines these previous three meanings in reality. He concludes by emphasizing that only through integration does research become worthy of trust.

Thus, cognitive integration is essential for the development of both the scientific model and the civilizational model, as human progress requires expanding research and involving all supporting sciences. It is necessary for achieving scientific and civilizational achievements.

It also has an impact on intellectual and cognitive development, as Munir Ali Abdul-Rab argues that cognitive integration aims to reduce the state of reference fragmentation in contemporary Islamic reality, caused by the division between religious and worldly sciences. This integration will prevent the deepening of the absence and withdrawal from civilization that our nation has experienced for a long time, as a result of separating religious matters from worldly affairs. Studies and research have confirmed that the diversity of knowledge nurtures and sharpens the mind, and knowledge strengthens the intellect. Therefore, it is essential to nurture both knowledge and intellect; when the intellect is cultivated and taught to think, it will provide a true understanding of the realities of change and civilizational development, helping humans navigate the continuously evolving space of human knowledge.

3. Cognitive Integration in the Arabic Lexicon:

The integration of Arabic language sciences with one another is a prominent feature in Arabic and Islamic linguistic thought, especially evident when considering the lexicon, particularly the older ones. Its formation does not appear possible without involvement of other sciences. However, lexicographical works varied in this integration, mainly due to differences in methodology, material arrangement, and the goals behind authorship. This undoubtedly affirms the composite mentality of the Arabs at that time, as evidenced by the various sciences their scholars engaged in—syntax, rhetoric, jurisprudence, hadith, astronomy, and medicine, all at once—unlike today, where precise specialization often leaves little room for knowledge outside one's field.

- **Second: The Position of Specialized Lexicons in the Classification of Sciences in Arab and Muslim Thought:**

1. Observing the Classification of Sciences and Terms by Early Scholars:

Scholar Fathi Hassan Malkawi considers the topic of the classification of sciences to be one of the important keys to understanding Islamic intellectual heritage. The efforts of scholars in Islamic history regarding this issue can be seen as attempts to explain different forms of the relationship between these sciences, based on whether this relationship represents a unifying or differentiating principle.

"Sometimes, it is necessary to consider both directions together." Al-Malkawi continues his discussion about the history of this approach in classifying sciences and its relationship with Arab scholars, saying:
"But the idea of classifying sciences is ancient, and many of the ancient classificatory ideas that are still circulated in discussions about the types of sciences and knowledge are based on classifying sciences according to the standard of abstraction as presented by Aristotle. The sciences that are more abstract are considered to be of higher rank and more important than practical sciences. The main observation here is the attempt to separate the sciences and affirm their independence, arranging them in terms of importance. Although some Muslim scholars were influenced by this classificatory foundation, especially those who followed the Aristotelian philosophical method, most scholars were more original when they sought for the classification in the Islamic perspective to reflect the holistic Islamic vision and its requirements."

1.1. The Essence of Science Classification and Its Goals:

At the outset, we note the diversity of names used to denote the subject of this science among the Arabs. For example, some call it: (The Science of Divisions of Sciences), others call it: (The Science of Kinds of Sciences), and some scholars refer to it as (The Science of Classifications), in addition to other compound linguistic terms that Arabs have used to indicate the subject and nature of this science.
It is clear that this multiplicity, or difference, in terminology, while it may reflect a kind of linguistic confusion or disorder, undoubtedly indicates, on the other hand, the richness and diversity of classificatory attempts across different scholars and eras, knowing that this difference remains a linguistic one that barely touches the foundational principles or goals behind those pioneering scientific attempts.
As for the essence of the science of classification, it is one of the most important scientific discussions that flourished notably in our Islamic civilization. It became an independent science with its own principles, objectives, and representatives, including scholars, philosophers, and thinkers, shortly after the emergence of the scientific movement in Arab society.
It is also worth noting that despite this science being described as an organizational tool for knowledge seeking to arrange sciences, define their subjects, and methods according to a philosophical view, there has been some disagreement regarding whether it is part of the philosophy of science or if it precedes or follows it.
In the lexicographical sense, "classification" refers to diversification and compilation, including the classification of books. Terminologically, it means the classification of things or meanings and their arrangement in a specific system and on a certain basis, such that their relationship to one another is evident, including the classification of beings and sciences.

1.2. The Arab Contribution to the Classification of Sciences:

Muslim scholars paid great attention to the field of classifying sciences and scientific terms from the early stages that coincided with the establishment of Arabic Islamic sciences, and this continued in later periods of contact with foreign cultures through translation, especially Greek – even though no work from their famous philosophers such as Plato and Aristotle had any influence in this area; this is clearly evident in the huge number and vast volume of works they left us in the path of Arabic excellence in this important field of research concerned with classifying sciences, organizing them, and defining their methods and objectives, despite the varying approaches of our scholars and their paths in dividing sciences and arranging knowledge, whether derived from the Holy Qur'an, the noble Hadith, poetry, or reflecting their tremendous efforts in natural sciences, experimental sciences, and mathematics. In this context, we point out that this type of independent writing was first realized in human history by Abu Nasr al-Farabi (d. 339 AH) in his famous book "Ihsa' al-Ulum" (Enumeration of the Sciences), excluding of course the attempts of Jabir ibn Hayyan (d. 200 AH) in the second half of the Hijri century and Al-Kindi (d. between 252-260 AH), as their contributions were progressive attempts in the field of classification of sciences, but they did not write an independent book or dictionary on the subject; their classifications were mentioned within their discussions of objects and concepts in their treatises on definitions.
What indicates the early knowledge of the Arabs of scientific terminology is their knowledge of medical terms such as those introduced by Al-Harith ibn Kalda al-Thaqafi, who lived until the middle of the first Hijri century, and others from

the early doctors of the first Hijri century, such as Rifa'a al-Tamimi, Raghida al-Islamiya, Dhamad al-Asadi, Abu al-Futuh al-Mustawfi, Ibn Athal, and Nasiba al-Ansari.
What can be said in this regard is that these Muslim contributions indeed reflect bright aspects of their scientific creativity, which led the Orientalist Franz Rosenthal (1914-2003) to praise the Arab efforts in the classification and presentation of sciences in an organized manner, considering their writings and treatises as a distinguished scientific project, different from previous Greek classifications.

1.3. Benefits of Classifying Sciences:

The classification of sciences has numerous and important benefits, especially considering its educational goal. Abu Nasr al-Farabi says in his book "Ihsa' al-Ulum": "A person benefits from what is in this book if they want to learn any of these sciences and reflect upon them, so they will know what to prioritize, what to reflect upon, what will benefit their reflection, and what is the value of that, and what virtue will be gained from it, so that their approach to studying the sciences will be based on knowledge and insight, not on blindness and delusion."

2.Terminological Dictionaries:

The ancient Arabs left behind a rich lexicographical heritage, with terminological dictionaries being one of its most important forms. This lexicographical work spanned over eight full centuries. Since Al-Khwarizmi (d. 387 AH) wrote his book "Mafatih al-Ulum" (Keys to the Sciences), the publications in this field have continued, encompassing many sciences such as: Tafsir (exegesis), Hadith (prophetic traditions), logic, philosophy, geometry, arithmetic, music, astronomy, medicine, ethics, and Sufism.
Among the most prominent dictionaries that followed the example of Al-Khwarizmi was "Al-Ta'rifat" by Al-Sharif al-Jurjani (d. 816 AH), "Maqalid al-Ulum fi al-Hudud wa al-Rusum" by Al-Suyuti (d. 911 AH), "Al-Kulliyat" by Abu al-Baqa' al-Kafawi (d. 1094 AH), and "Abjad al-Ulum" by Al-Qanouji (d. 1307 AH), to name but a few.

2.1. The Importance of Terminology in Understanding Sciences and Knowledge:

A modern scholar argues that:

"Terminology is considered the key to sciences and one of the most important cognitive tools in transmitting information. It is said that understanding terminology is half of knowledge because a term is a word that expresses a concept, and knowledge is merely a collection of interconnected concepts that form a cognitive system. The importance of terminology has been emphasized to the point that the Global Terminology Network in Vienna, Austria, adopted the motto: (No knowledge without terminology). A term is an abbreviation and summary of an issue with the element of agreement, considering linguistic contexts, and reaching the intended meaning with the most precise expressions and the fewest words. We use the concepts that we express through terminology and symbols primarily to organize scientific ideas and all other information."
The same scholar confirms the authenticity of the science of terminology among Muslim scholars since the early Hijri centuries and their awareness of it, emphasizing that "the term (Term) is not something new, nor is it specific to the West or derived from them, but it is something present in the heritage; the words (مصطلح) and (اصطلاح) are synonymous in Arabic, derived from (اصْطَلَحَ) with the root (صَلُحَ) meaning (اتَّفَقَ), because a term or terminology indicates the agreement of specialists to use it to express a specific concept. When we look back at the books of Arab heritage, we find that the concept of (مصطلح) and (اصطلاح) is used in a way that reflects a special interest in this concept. For example, Al-Jahiz (d. 255 AH) says: "And they chose those words for those meanings, and they derived those names from the speech of the Arabs, and they agreed to name what had no name in the Arabic language; thus, they became predecessors for future generations, and role models for all who follow."

2.2. Defining Terminological Dictionaries:

These encyclopedic terminological dictionaries are "publications that present the terms of knowledge according to a specific classification of sciences and keys to each science, or general terms arranged alphabetically."
They also refer to a type of dictionary concerned with defining and determining the terms of various sciences. The feature of this type of lexicographical works is the diversity of sciences and arts contained in the dictionary.

2.3. In the Context of Emergence and Development:

One scholar argues that:
"With the expansion of Islamic conquests outside the Arabian Peninsula and the entry of various peoples under the banner of the Islamic state, the translation movement into Arabic became active to absorb the knowledge and sciences of these peoples. This led translators to expand the scope of the Arabic language by creating innovative terms and broadening its derivational circle to meet the needs imposed by various sciences, such as mathematics, astronomy, medicine, philosophy, and logic.
Although the early attempts at translation were poor and weak due to the absence of scientific terms in Arabic, which led translators to carry them over as they were from Greek, Persian, and Indian, such as 'Analytica' (analysis) and 'Arithmetica' (mathematics), over time, the Arabic language matured. It was enriched with a large number of terms that enabled it to express Aristotle's logic, Plato's philosophy, Hippocrates' medicine, Ptolemy's astronomy, and Euclid's mathematics with ease."
This scholar further elaborates on the reasons for the establishment of a science dedicated to this field, saying:
"It became necessary to standardize these terms, define their meanings, and derive them, after adapting foreign terms to match Arabic forms or translating them into Arabic words, following the discovery of Arabic's ability to express them with ease and deeper meanings. This was achieved by creating dictionaries that organized this flow of new words and meanings, particularly in the fields of science and philosophy. From this need, the importance of the first book written in Arabic to account for scientific terms and standardize their meanings in various branches of knowledge comes into focus, which is the book Mafatih al-'Ulum by Muhammad ibn Ahmad ibn Yusuf al-Khwarizmi, who is described as the author of the first encyclopedic work of scientific terms in the history of Arab-Islamic civilization."

Third: The Dictionary *Mafatih al-'Ulum* by Al-Khwarizmi and *Abjad al-'Ulum* by Al-Qunnuji – A Descriptive Analytical Comparative Study in Terms of Purpose and Methodology:

1. *Mafatih al-'Ulum* by Al-Khwarizmi:

We will examine the reasons for the creation of this famous dictionary, its sections, its first appearance, and its classification method.

- **Introducing the Dictionary:** A brief overview of the life of this great scholar and the context of the creation of this work.
- **Introduction to Al-Khwarizmi:** Muhammad ibn Ahmad al-Khwarizmi (d. 387 AH / 997 CE) is Abu Abdullah Muhammad ibn Ahmad ibn Yusuf al-Khwarizmi, a researcher from Khurasan. He authored *Mafatih al-'Ulum* and dedicated it to the minister Ubayd Allah ibn Ahmad al-'Atabi. Al-Zirikli stated: "His book is considered one of the earliest encyclopedic works compiled by Arabs."

1.1. Technical Card for the Dictionary *Mafatih al-'Ulum*:

Al-Khwarizmi mentioned in the introduction of his book the reasons for its creation, explaining the importance of the term as an entry point to studying the sciences: *"My soul urged me to compile a book (...) that would gather the keys to sciences and the beginnings of crafts, covering the conventions and terminologies that each level of scholars used, which were absent or barely found in books on the science of language. Even a linguist distinguished in literature, if he examined a book written in the fields of science and wisdom without having learned the subject, would understand nothing from it and would be like a mute illiterate when looking at it."*
Moreover, *"Al-Khwarizmi made his book a kind of entrance and key for students and researchers dealing with any science, to learn the terms used in it, and also to be a simplified guide for the general intellectuals who wish to explore sciences and literature. He said, 'The people most in need of understanding these terms are the refined scholars who have realized that the science of language is a tool for achieving virtue.'"*
It is worth mentioning that there are only three manuscripts of *Mafatih al-'Ulum* in the British Museum in London and the libraries of Leiden and Berlin in Germany. In contrast, the book was printed several times in the Arab world during the 20th century, the first of which was in Egypt in 1930 based on Van Floten's edition after being reviewed by Muhammad Kamal al-Din al-Adhami.

1.2. Its Sections:

Al-Khwarizmi divided his encyclopedic work *Mafatih al-'Ulum*, which he reportedly completed a few years before his death and dedicated to Abu Abdullah Ahmad ibn Abi al-'Atabi, into two main sections. The first is dedicated to religious sciences and related fields such as Arabic language arts like writing, grammar, poetry, and prosody, in addition

to history and geography. The second section consists of nine chapters on sciences borrowed from other nations, including medicine, arithmetic, geometry, astronomy, chemistry, mechanics, philosophy, logic, and music. The total number of chapters in the book is fifteen, divided into ninety-three sections.

1.3. The Admirations of Orientalists:

The book *Mafatih al-'Ulum* did not receive adequate attention from Arab researchers except occasionally. However, it found resonance and thorough study from orientalists, which was impressive. It is noteworthy that the book appeared in its original Arabic for the first time in a publication by the German orientalist Van Floten in 1895, at the end of the 19th century. This was surprising to orientalists due to its detailed structure and method of compilation. It was truly a declaration of the opening of serious scientific research into the study of the terms contained in the book during the 4th Hijri century, or the 10th CE century.

1.4. Terms in *Mafatih al-'Ulum*:

This dictionary contains 2,382 terms distributed across the two sections, which are further divided into twelve chapters, ultimately broken into ninety-three sections. It encompasses the scientific terms of the Arabs, classified into six sections: jurisprudence, theology, grammar, writing, poetry and prosody, and news.

A contemporary scholar argues that the emergence of this massive dictionary was a response to many unresolved questions regarding the science of terminology in the Arab world, particularly concerning the 4th Hijri century and the creation and importation of terms from other languages, and their integration into the Arabic language in an appropriate manner. Furthermore, *Mafatih al-'Ulum* also discusses the semantic change of a word depending on the scientific field it is used in. For example, the term "watan" (peg) in linguistics refers to a structural support, but in prosody, it refers to a combination of three letters—two moving and one stationary. In astronomy, "watan" also refers to one of the four positions in the zodiac known as the 'rising star.'

1.5. Features of *Mafatih al-'Ulum* and its Implications:

One of the features that assist the observer in understanding the methodology of Al-Khwarizmi's compilation of *Mafatih al-'Ulum* and its categorization method is the following:

- A positive aspect of Al-Khwarizmi's classification of sciences is his avoidance of the Greek philosophical perspective, distinguishing between original Arabic sciences by using an accumulative method that focused on description and statistics without emphasizing the hierarchical order of sciences. His classification model blends philosophical and bibliographical methods, adopting a concise and precise approach while avoiding redundancy and focusing on common and familiar terminology. He refrained from delving into etymology and avoiding complex explanations of foreign terms that had been Arabized. This method set the foundation for the science of terminology and encyclopedic classification, influencing all those who followed him in this field.
- Al-Khwarizmi's exploration of the semantic change of terms by illustrating their meanings across different fields, as previously mentioned.
- The dual listing of a single scientific field under multiple disciplines, making it more organized according to the rules of many scientific branches. For instance, Al-Khwarizmi lists the science of inheritance both under the domain of arithmetic and Islamic jurisprudence due to its relevance to both fields.

2. *Abjad al-'Ulum* by Al-Qunnuji:

We will examine the reasons for the creation of this famous dictionary, its sections, its first appearance, and its classification method.

- **Introducing the Dictionary:** A brief overview of the life of this distinguished scholar and an introduction to his dictionary.
- **Introduction to Al-Qunnuji:**

Abu al-Tayyib Sidiq ibn Han Al-Qunnuji, born in the town of Bireli and raised in Qunnuj, one of the oldest and most important cities in India, later moved to Delhi and studied under the jurist Muhammad Sadr al-Din Khan. He returned to Qunnuj and later settled in Bhopal, where he served as minister and married the Queen of Bhopal. Despite his ministerial position, Al-Qunnuji was passionate about authorship and written works, especially in the fields of the Quran, Hadith, theology, language, and literature, with more than 45 books attributed to his name.

2.1. Technical Card for *Abjad al-'Ulum*:

- The dictionary *Abjad al-'Ulum*, published in the 19th century by Al-Qunnuji, is a vast encyclopedia that outlines the states of sciences and compositions within them, and provides biographies of the scholars in each field in three parts. Each part is given an independent name or title.

Part One:

Its title is (The Embroidered Embellishment in the Explanation of the States of Knowledge), which was brilliantly organized and elaborated upon. The author divided it into a preface, six main chapters, and a conclusion. In each chapter, he included sections and paragraphs, creating innovative titles for them, aiming for good organization and precision in the classification and presentation.

Part Two:

It is titled (The Gathered Clouds Raining with Various Arts and Types of Sciences). This is the largest and most content-rich part of the work. It comprehensively covers what was written in Arabic about the sciences from the beginning of their formation up until his time, across various fields of knowledge such as the sciences of the Quran, Hadith, language, grammar, literature, philosophy, jurisprudence, history, politics, astronomy, geography, medicine, pharmacy, mathematics, and music, as well as their branches. After organizing them alphabetically, the author provides definitions for each science individually, along with examples of the books written in that field. Thus, the student of knowledge must know the title of the science they are seeking, identify it in the alphabetical order, and then find detailed information about the science's subject, principles, rules, and branches, complemented by examples of books in that field.

Part Three:

It is titled (The Sealed Nectar from the Biographies of the Imams of Knowledge). This section of the dictionary is dedicated to the biographies of those who authored works in the sciences and arts mentioned in the second part of the book. The list of these scholars is divided into twenty (20) groups, each dedicated to a specific field. For example, it includes scholars in language and morphology, prosody and rhyming, composition and literature, rhetoric and expression, debates, poetry, history, logic, dialectics, philosophy, medicine, legal theory, jurisprudence, Hadith memorization, inheritance, and astronomy. This section is concluded with biographies of scholars from five regions: the two holy cities of Mecca and Medina, Yemen, India, Kanauj, and the Bhopal region in India.

2.2. Terminology of the "Abjad al-'Uloom" Dictionary:

As mentioned earlier, the scholar al-Qanouji has authored more than sixty works, both printed and manuscript, many of which are lost. However, the "Abjad al-'Uloom" dictionary remains one of his largest and most comprehensive works. A researcher in terminology would benefit from this dictionary in two key ways:

- **First:** It introduces terms that al-Qanouji invented in the art of composition and classification, such as: al-'Ifham (clarification), al-Ifsaah (expression), al-Talweeh (hinting), al-Isharah (indication), al-Tarshih (suggestion), al-Munazara (debate), al-Fath (opening), al-Fawa'id (benefits), al-Matlub (demand), al-Nuktah (point), and others. These terms are numerous in his work and differ from traditional terminology used by other classifiers, such as "chapter," "section," "introduction," and "conclusion."
- **Second:** The dictionary includes terms mentioned in the context of core sciences like medicine, pharmacy, astronomy, geography, mathematics, and music, some of which are traditional and others are of his own invention.

The second, largest part of the work is the richest in scientific terminology, with terms that have been passed down in lexicographical works, as well as those created by the author himself. His language and expressions have elevated these terms to a refined level of scientific terminology, making it a valuable dictionary that truly reflects the brilliance of encyclopedic thought in classification and terminology.

2.3. Insights from This Dictionary:

The dictionary contains incredibly valuable information about various sciences and arts. The author has gathered a wide range of scientific and intellectual treasures, incorporating the sayings of ancient and contemporary scholars. This book reflects the author's vast knowledge and comprehensive understanding of a variety of fields. It is considered one of the most important sources for definitions of sciences and arts, documenting the history of Islamic culture in India and its vast scientific encyclopedias, which include biographies of prominent Indian figures, scholars, writers, and intellectuals. Anyone who reads this book will come to the conclusion that the subcontinent produced numerous distinguished scientific and literary personalities who played a significant role in expanding the scope of Islamic civilization.

At the end of this study, the comparison between the "Mafatih al-'Uloom" (Keys of the Sciences) by Al-Khwarizmi and "Abjad al-'Uloom" by al-Qanouji reveals two complementary epistemological paths in building the Arabic terminological encyclopedia, both of which express the evolution of lexicographic methods from foundational beginnings to more complex systematic awareness. The "Mafatih al-'Uloom" is distinguished by a functional approach that focuses on presenting the term within its scientific context and making it more accessible to the reader, using a traditional classification system that ties language with scientific content and brings together the sciences of both Arabs and non-Arabs, reflecting the cultural openness of the 4th century Hijri (10th century CE). On the other hand, "Abjad al-'Uloom" advanced the lexicographical method to a broader level through a precise three-part structure that organizes the presentation of sciences, their works, and their scholars, revealing a deeper historical and methodological awareness of scientific classification in the later Islamic period. The comparison indicates that, despite differences in historical and methodological contexts, the two dictionaries share a common effort in using Arabic as a medium to convey scientific concepts, showcasing its ability to express both precise and human sciences with great flexibility.

Conclusion:

This study concludes, after reviewing its content and analyzing its examples, a series of scientific results that confirm the central role of terminological dictionaries in the Arabic scientific project and their close connection to the principle of integrated knowledge. It became clear that Arab and Muslim scholars did not view sciences as fragmented disciplines but sought to incorporate them into a harmonious framework that considers the unity of knowledge and its educational and methodological purposes. Dictionaries such as "Mafatih al-'Uloom" and "Abjad al-'Uloom" demonstrate the Arabic language's ability to keep pace with scientific and epistemological transformations, developing precise terms that encompass both natural and religious sciences as well as intellectual disciplines. The study also shows that these dictionaries were not merely tools for interpreting words but were intellectual projects with an encyclopedic scope, serving as real mediums for transferring knowledge, facilitating understanding, and refining concepts.

While "Mafatih al-'Uloom" distinguished itself by bringing together the sciences of both Arabs and non-Arabs in an organized technical system, "Abjad al-'Uloom" excelled with its three-part structure, representing the peak of encyclopedic lexicographical achievements in the last two centuries of Islamic civilization. Therefore, reviving this heritage and adapting its methodologies in contemporary knowledge contexts is a scientific necessity, as it carries lessons on openness, integration, and the interconnectedness of sciences, especially in an era where excessive specialization threatens the unity of knowledge and weakens the potential for deep and comprehensive understanding.

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