# The Numerical, Calculative, and Codification System in the Maghreb: A Historical and Documentary Study

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## Abstract

This study delves into the intriguing interplay between numbers and letters, with a focus on their role in letter calculation and encoding among Muslims in the Western Islamic world. It traces the historical evolution of Arabic numerals, originating from the Indian numeral system known as *Ghubār* numerals, and their lasting impact in the Maghreb region until the 19th century AD. The research meticulously examines the sophisticated system of obfuscation and encryption, essential for safeguarding sensitive information during confidential exchanges, thus leaving a profound imprint on numerical practices in the Islamic West. These cryptographic techniques not only ensured information security but also significantly influenced the cultural and socio-economic landscape of the region, fostering trust in commercial transactions and potentially affecting diplomatic exchanges and the preservation of religious texts. This intricate symbiosis between numbers and letters showcases the intellectual ingenuity of Muslim scholars, who utilized mathematics and encryption methodologies to navigate and shape the complexities of their society.

**Keywords**: Letters of the Alphabet; Calculation; Encryption; Islamic West; Numeration.

**Introduction:**

The historical interactions between Arabs, Persians and Indians, favored by robust trade relations, led to extensive knowledge exchange, especially in the field of numbers. The Arabs appreciated the efficiency of the Indian numerical system — often referred to as *Ghubār* numerals — and incorporated these numerals into their accounting practices. This adoption spread throughout the Arab East and remained particularly widespread in the Maghreb region until the 19th century AD. The utilization of these numerals is well-documented in historical manuscripts, showcasing their integration into the decimal system. Those well-versed in this numerical system utilised it to encode confidential transactions, marking its vital role in commercial and economic activities.

**Importance of the Topic:**

Our study illuminates the symbiotic relationship between letters of the alphabet and numerals within Arab civilization, which is crucial for commercial and economic endeavors. It seeks to underscore the significance of the abacus system and the clandestine

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encryption processes employed in various correspondences, highlighting their pivotal role in facilitating transactions.

**Study Problem:**

This study addresses several key questions:

- What is the historical relationship between numerals and letters in the Arabic heritage?
- What is the concept of letter calculation and how is it performed in historical documents and texts of the Maghreb?
- How are numerals documented and what is the significance of fractions in the monetary system?
- How are numerals recorded and what role do fractions play in the monetary system?
- What coding systems were used in Maghrebi culture and how were they used?

**Methodology;**

Our research methodology includes an analytical approach, an historical methodology and a statistical analysis. In addition, we will gain insight into traditional texts to explain calculation methods and techniques for summation. The study will also look at coding systems through various documentary models to enhance our understanding of information concealment practices in Maghrebi culture.

**1. Nature of Encryption and Information Concealment System**

The encryption and concealment system discussed in this study delves into various methods used historically for encoding and hiding information. We previously explored the al-Jumaal system, where letters are converted into numerical information, and the Abjad Hawwaz calculation method.

In addition to these, there exists a third system utilized in manuscript numbering and Sharia court documents, particularly in the far-reaching regions of Morocco, known as the Fasi Pen (Colin 1933: 214), which evolved from a tool for numbering to an encryption method for concealing information in correspondence.

The term “encryption” comes from the Greek word kryptos, which means hidden and is related to the term "cypher"," which is derived from the Arabic word for zero.This concept, integral to numerical systems, allows for transforming clear text into an incomprehensible form using specific methods. Those familiar with the method can decrypt and understand the text, showcasing the dual nature of encryption as both a means of protection and a tool for communication in coded form (Muhammad et al., 1987: 28).

The origins of the science of calculation associated with encryption among Muslims can be traced back to the third century of the Hijrī calendar (ninth century AD) (Singh, 2000: 32-33). This began with the pioneering efforts of scholars such as Ya‘qūb ibn Isḥāq al-Kindī, his student Ahmad al-Balkhī, and Ibn al-Durayhim al-Mawṣilī. Despite India, Greece, and Persia having historical precedence in the sciences of calculation and encryption, Arabs and Muslims, particularly Moroccans, distinguished themselves in this domain. They devised numerous solutions to mathematical and astronomical challenges that engaged their intellects.

The scholar Muḥammad al-Ṣaghīr al-Marrākushī, a historian of the Saadian dynasty, offered a concise definition of encryption: “To mention the name and intend the named, or mention the named and intend the name. Know that they do not insist on deriving the name by its diacritics (short vowels) and full vowels. They are satisfied with obtaining the word without paying attention to its specific forms. If that happens in poetry, it is considered an enhancement and is called the decryption work.”

Encryption, therefore, involves a straightforward explanation based on using a specific set of letters of the Arabic alphabet to represent intended names, albeit in a concealed manner. To illustrate this concept.

**2.The relationship of numbers to Arabic letters**.

Cryptology has its origins with the Arabs, who were pioneers in the methods of cryptanalysis. In the 7th century, their rapidly expanding civilization promoted advanced science, medicine and mathematics and introduced the term “cypher” to the world. Arab culture flourished in the fields of literary arts, storytelling and linguistic studies, including the development of cypher techniques (Kahn David Khan 1993: 93).

**2.1 Numerals**

Numerals serve as symbols to represent quantities, with significant variations including Eastern or North African dust symbols. Before the widespread adoption of Indian numerals and the development of the abjad system of numerals (letter numerals), Muslims relied on these symbols. Both Moroccan Amazigh and Eastern Arabs contributed to the evolution of abjad numerals, which persisted in Muslim writings until relatively recently.

For instance, the current Hijri year 1446 is expressed as (و=6 - م =40- ت =400- غ=1000) forming the word "غتمو" when combined. In contrast, the Gregorian year 2024 is represented as (د=4.ك=20 + غ=1000+ غ=1000), totaling غغكد based on the letter equivalence table (Table 1). Eastern Indian symbols, also known as air numerals, are written as (٠ ١ ٢ ٣ ٤ ٥ ٦ ٧ ٨ ٩). The primary difference in letter values between Moroccans and Eastern Arabs lies in specific letters and their numerical equivalents (Figure 1). In order to avoid repetitions as much as possible, we immediately compared the Arabic letters of the naskhi style with those of the Maghrebi style. However, it should be noted that among the Arabs of Western Africa, there are six letters whose numerical value differs from that in the Asian abjad. Thus, ic (ش) represents 300 among the Maghrebis (Figure 1). This difference arises because the Arabs of the Maghreb do not quite observe the same order as the Eastern Arabs in the classification of their abjad. One can easily reconstruct the Maghrebi abjad by placing these six letters in the position indicated by the number each represents among the Western Arabs, without altering the other letters, whose values remain unchanged.

| Letter | Value in the Eastern Abjad System | Value in the Maghrebi Abjad System |
|---|---|---|
| ي (Yāʾ) | 10 | 300 |
| ك (Kāf) | 20 | 10 |
| ش (Shīn) | 300 | 1000 |
| ص (Ṣād) | 90 | 60 |
| ض (Ḍād) | 800 | 90 |
| غ (Ghayn) | 1000 | 800 |

**Figure 1: Numerical Differences Between the Eastern and Maghrebi Abjad Systems. Source: created and compiled by the researcher.**

**Table 1: Letters and Their Numeric Values**

| Value of Each Lette | Maghrebi Lettes | Easten Script Letters | Alphabetical Word |
|---|---|---|---|
| 1 | أ | أ | أبجد |
| 2 | ب | ب | |
| 3 | ج | ج | |
| 4 | د | د | |
| 5 | ه | ه | هوز |
| 6 | و | و | |
| 7 | ز | ز | |
| 8 | ح | ح | حطي |
| 9 | ط | ط | |
| 10 | ي | ي | |
| 20 | ك | ك | كلمن |
| 30 | ل | ل | |
| 40 | م | م | |
| 50 | ن | ن | |
| 60 | س | س | سعفص |
| 70 | ع | ع | |
| 80 | ف | ف | |
| 90 | ص | ص | |
| 100 | ق | ق | قرشت |
| 200 | ر | ر | |
| 300 | ش | ش | |
| 400 | ت | ت | |
| 500 | ث | ث | ثخذ |
| 600 | خ | خ | |
| 700 | ذ | ذ | |
| 800 | ض | ض | ضظغ |
| 900 | ظ | ظ | |
| 1000 | غ | غ | |

Source: Pihan 1860

**The numerical values of letters according to the Maghrebi system.**

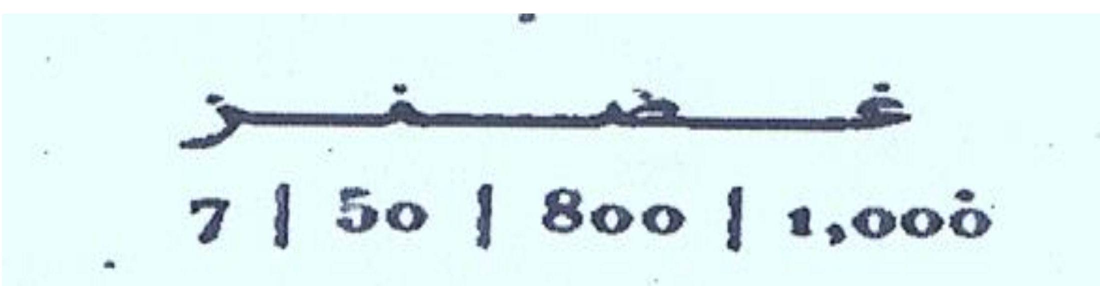



**Figure 02. Example of Gematria Calculation. Source: Pihan 1860: 203.**

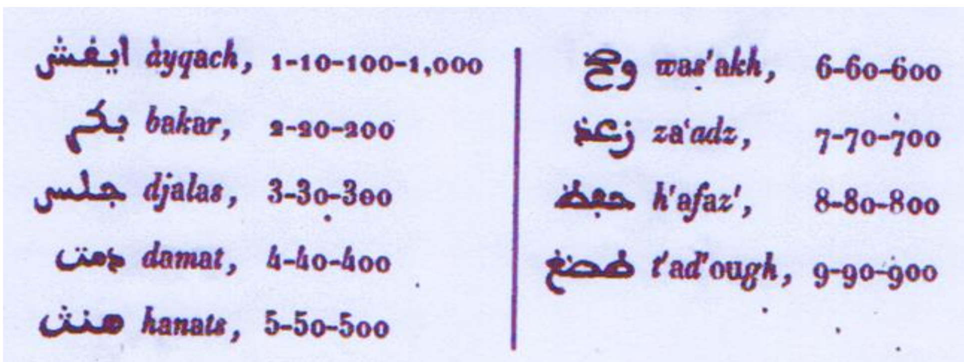
If we take the name "سيف يوسف" (Sayf Yousef) with a hypothetical birth year of 1983, and aim to calculate the sum of the numerical values of the letters while keeping the birth year undisclosed, we can proceed as follows:

س = 60 ي = 10 ف = 80 ي = 10 و = 6 س = 60 ف = 80

Using the Eastern calculation method, the sum is 306. However, in the Western calculation method, the letter "س" is valued at 300, resulting in a total of 486 when all values are summed.

To represent a year of birth numerically, we could use the formula: 1000= =900+غ ج=03+ف=80+ظ, resulting in the word "غظفج" (Eastern method). In Maghrebi accounting, the approach differs with letters represented as ج = 03 + ف = 80 + غ = 900 + 1000 = ش, yielding the word "شغفج" (Maghrebi calculation).

According to French linguist Présnié, who authored "A Practical and Theoretical Course in Arabic," the inhabitants of the Maghreb region utilize a classification system termed "àyqach," comprising nine technical terms aligning with the order of numbers representing units, tens, etc. (Pihan 1860: 213).



| | | | | | |
|---|---|---|---|---|---|
| ايقش | àyqach, | 1-10-100-1,000 | وسخ | was'akh, | 6-60-600 |
| بكر | bakar, | 2-20-200 | زعذ | za'adz, | 7-70-700 |
| جلس | djalas, | 3-30-300 | حفظ | h'afaz', | 8-80-800 |
| دمت | damat, | 4-40-400 | طضغ | t'ad'ough, | 9-90-900 |
| هنث | hanats, | 5-50-500 | | | |

**Figure 3. comprising nine technical terms**

Source: Pihan 1860.

## 3. Recording Numbers in Historical Documents and Manuscripts

### 3.1 Punctuation in the Islamic Maghreb:

The Arabic passage focuses on the analysis of historical documents and manuscripts, particularly those pertaining to trade or donations. It underscores the significant presence of numerical figures within these documents. These numbers can originate from either Eastern or Western traditions. Figure 4 is referenced, depicting an 18th-century historical document written in Maghrebi script but featuring Eastern numerals (Annak 2017:162-176).

**Figure 4 Maghrebi Numbering Model**

Source: Document No. 01.


**Figure 5. Hindu Arabian numbers.**
Source: Document No. 01.

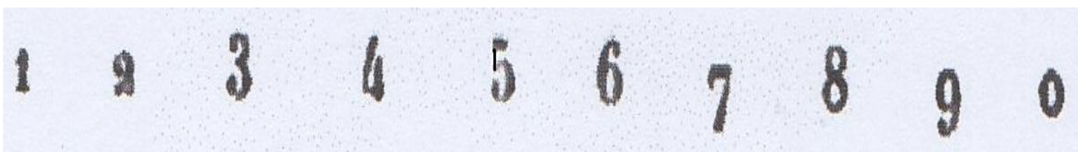



**Figure 6. Maghrebi and Modern Global Numerals.**
Source: Pihan 1860: 203.

This phenomenon has persisted until recent times, with two distinct Arabic forms utilized interchangeably, as depicted in Figures 5 and 6. Figure 5 showcases Hindu-Arabian numbers, while Figure 6 presents modern Moroccan and international numbers. Notably, the digit 5 is rarely used in the first model when replaced by a dot, which typically signifies zero. However, maintaining the dot occasionally occurs without causing errors.

Figure 7 introduces special Turkish numerals associated with Indian numerals, notably seen in wall clock frames. Variations in numeral shapes, particularly in numbers 4, 9, and 0, are evident in this context.

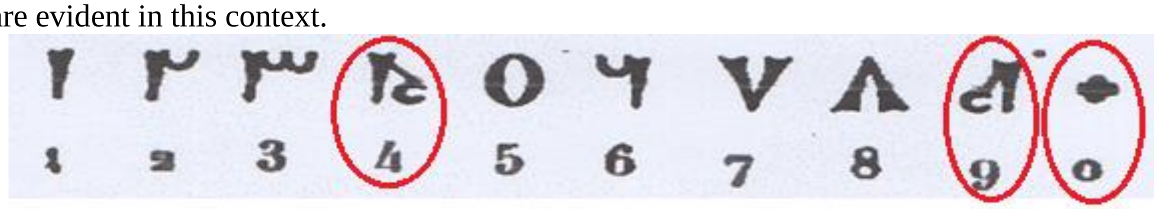



**Figure 7. Variations in numeral shapes Numerals.**
Source: Pihan 1860, p. 208.

**3.2 Dust Numerals:**

Within Arabic manuscripts of mathematics or astronomy, a unique set of numerals known as Dust Numerals can be found (*ghobâr*) (Figure 8). These numerals possess slightly different shapes compared to regular numerals.

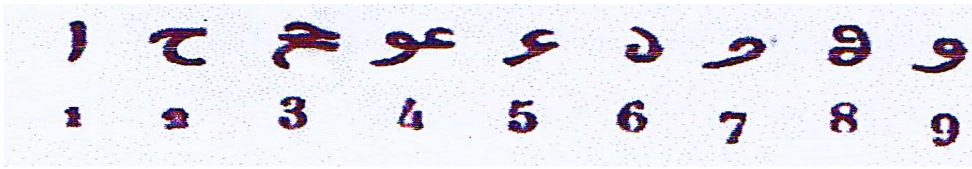


**Figure 8. ghobar numerals.**
Source: Pihan 1860: 208.

In this numerical system, scribes would draw and write these numerals before sprinkling dust or sand on them to dry the ink (Al-Tazi 1983: 61). Notably, zero was not represented explicitly but indicated by placing a dot above the numeral, signifying tens, with two dots for hundreds, three dots for thousands, and so forth (al-Qalṣādī 1875: 2-3). Figure 9 exemplifies this notation.


**Figure 9. ghobar numerals**

In the context of number 10, when delving into documents and manuscripts related to mathematics and astronomy, particularly those originating from the Maghreb countries (Woepcke 1863: 63), a distinct set of numerals comes into focus:

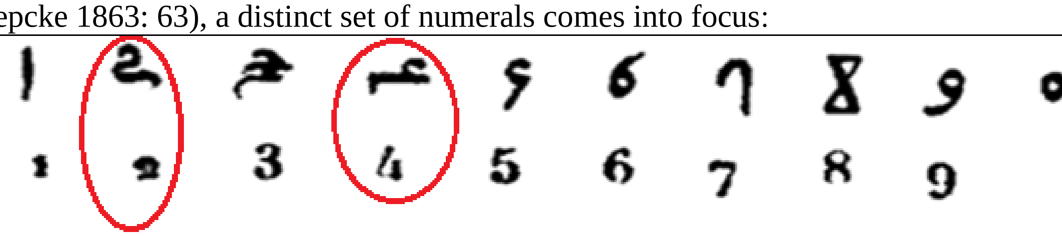


Figure 10. **The numbers used in daily transactions** .Source: Pihan 1860: 209.

Figure 10 vividly displays these numbers, revealing their historical usage in various daily transactions until recent times (Colin 1933: 211). Complementing this understanding, Figure 11 provides a detailed examination of two specific numbers within document number 01, offering clarity on their shapes and forms as used in practical contexts (Bresnier 1915: 343).

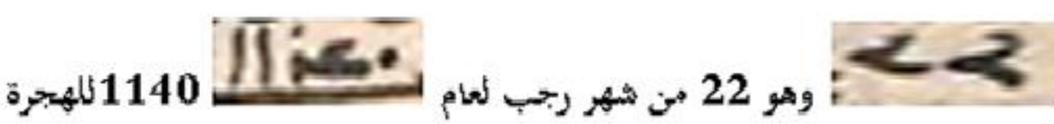



**Figure 11. Compare this figure with Figure No. 10. Source: document 01.**

A notable aspect worth highlighting is the potential for confusion caused by variations in the tail or slanting of digits, such as the unique tail of the number four. Such nuances, coupled with the challenges posed by the roughness of pen nibs during that era, could contribute to errors in interpreting these numbers accurately.

Figure 12, dated to the year 1267 AH in the Islamic Hijri calendar, serves as a tangible example.

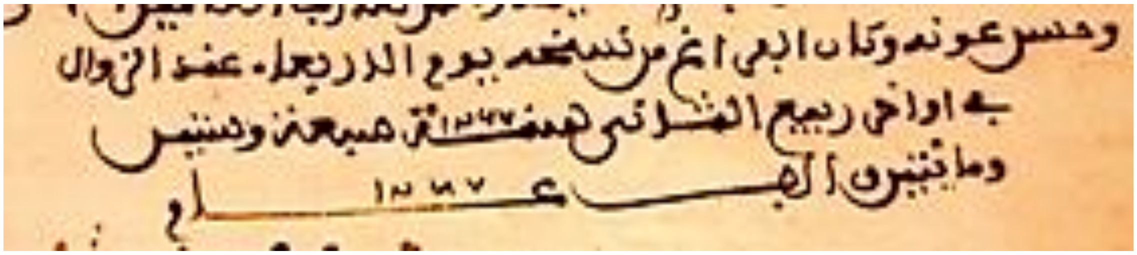


**Figure 12. dated to the year 1267 AH in the Islamic Hijri calendar, serves as a tangible example.**

**Document 01. Source: Annak 2017**

Here, the depiction of the number 6 closely resembles that of the number seven, illustrating the intricacies and potential pitfalls in interpreting numerical representations from historical documents.

**3.3 How to use fractions in the monetary system:** Fractions play a crucial role in our monetary system, often represented using familiar numerical fractions applicable to daily transactions. Specifically, monetary units are commonly divided into eight parts in many regions. It is customary to denote fractions to the right of the whole number, with emphasis placed on confirming their accuracy. For instance, fractions like five-eighths or three-quarters are frequently encountered.

Arab numerical sciences showcase their strength through the application of these fractional units, where, for example, 2/8 is expressed as 02 eighths, equating to a quarter . To illustrate this practically, one might state: “He valued his trust at two hundred dinars, two, plus one dinar and a quarter, along with fourteen dinars and half a dinar.” Converting this text into numerical form using Table Number 02 (Bresnier, 1915: 343) yields the following results:

| | |
|---|---|
| 201 2 | معناه (201 دينار و $\frac{2}{8}$) ومعناه الربع |
| 14 4 | معناه (14دينار و $\frac{4}{8}$) ومعناه النصف |

**Table 2. monetary value**

This is another example from Ibn al-Hā'im's commentary on the poem (Sharh al-Arjuz), on page 34b, where he explains his use of the decimal fraction in two ways to get the result: 10 or 0.5. He explains, "Do you not see that if you multiply five parts of a thing by two squares (as you know), the result would be ten things?" This is made clear in the following Table 3 by what Ibn al-Hā'im wrote and explained (Abdeljaouad 2002: 29).

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ن | م | ل | ك | ي | ط | ح | ز | و | هـ | د | ج | ب | أ |
| 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| غ | ظ | ض | ذ | خ | ث | ت | ش | ر | ق | ص | ف | ع | س |
| 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 |

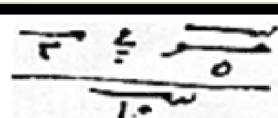
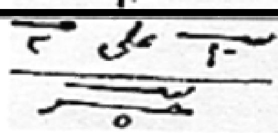
| ما كتبه بن الهايم في شرحه | التوضيح |
|---|---|
|  | $\frac{2 \times 5}{10}$ |
|  | $\frac{2 \text{ على } 10}{5}$ |

**Table 3. Explanation of the process of using a decimal fraction**

## 4. Encryption and Concealment System

### 4.1 Main encryption methods

Encryption is classified into two systems: encryption and coding, and the main difference between them is the length of the segment adopted from the plain text when converting it to cipher text. Encryption deals with each letter of the plain text or a group of letters not exceeding three, while the coding system deals with a word, phrase or entire sentence according to an agreed list.

Table 4. Treatise on Extracting Hidden Numbers. Source: Mrayati et al. 1987.

Traditional encryption methods (to which nothing new has been added since their inception by Al-Kindi until the middle of the twentieth century) are divided into three types, mentioned by Al-Kindi in his book “A Treatise on Extracting Hidden Numbers”, which is an amazing treatise in its information and the first known reference in the science of encryption and extracting the encrypted. (Mrayati et al. 1987 Vol 1: 106). They are: encryption by transposition or by changing the positions of letters, encryption by substitution, and encryption by adding nulls or deleting letters. The first two methods are basic, and each has a general rule and a key.

A - Encryption by reversal: This is done by changing the positions of the letters of the clear text according to a specific order without the letter losing its meaning.

It can be represented by reversing the letters of each word in the text, or shifting its letters, or mixing them.

B - Encryption by substitution or replacement: in which each letter of the text is replaced by a letter or symbol according to a specific rule without changing its position, or the letter is replaced by the letter that follows it or precedes it in the alphabetical order, or by using the abjad calculation or by using a “one-time record”. One of the most important methods of substitution encryption is to collect the letters of the message, after encoding them according to a specific numerical system, in a circular collection with the letters of an agreed-upon key. . (Mrayati et al. 198: Vol 1: 116). For example, if we encode the letters of the Arabic language with decimal numbers from 1 to 28 in alphabetical order, and the agreed-upon key is: “Kalila and Dimna” = B, the encryption process in this way would be as shown in Table 5. Let the message to be encrypted be: (Work intensifies tomorrow morning 9 =A Example of circular addition with base 28 “If the result exceeds 28, subtract 28”: 12+17=1 6+28=6 .The intended text is: “Shthha w sradh thmm mfuh”: = C . Thus, the encryption process performed by the sender is C=A Å B.

where A is the plain text, B is the key, and C is the cipher text. The receiver who knows the key performs the following operation: C=A ɵ B.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| د | غ | ل | ا | ج | ا | ب | ص | ل | م | ع | ل | ا | ف | ث | ك | ي | **Clear message A** |
| د | و | ه | ل | ي | ل | ك | ه | ن | م | د | و | ه | ل | ي | ل | ك | **Key B** |
| 4 | 28 | 2 | 1 | 3 | 1 | 2 | 18 | 12 | 13 | 16 | 12 | 1 | 27 | 23 | 11 | 10 | **Clear message encoding** |
| 4 | 6 | 5 | 2 | 10 | 12 | 11 | 5 | 14 | 13 | 4 | 6 | 5 | 12 | 10 | 12 | 11 | **Key Encoding** |
| 8 | 6 | 17 | 13 | 13 | 13 | 13 | 23 | 26 | 26 | 20 | 18 | 6 | 1 | 5 | 23 | 21 | **Circular Summation for Encrypted Message Encoding** |
| ج | و | ف | م | م | م | م | ث | ض | ض | ر | ص | و | أ | ه | ث | ش | **Encrypted message C** |

**Table 5. Message Decoding Table Using a Numerical System. Source: Mrayati et al. 1987.**

where Å is the circular addition of the measure /28/: modulo 28 and ɵ is the subtraction operation. (Mrayati et al. 1987 Vol 1: 124).

**4.2 Historical Example**

We can look at an example from the year 1736. Al-Mahdī al-Ghazāl, who had been an envoy of al- Sulṭān Mawlāy Ismā‘īl (1672-1727) in Spain and was tasked with negotiating the return of al-Sulṭān Mawlāy Zaydān’s library from Spain, composed a religious poem entitled “al-yawāqīt al-adabīyah fī al-amdāḥ al-Nabawīyah” Interestingly, he uniquely signed this poem by embedding the letters that make up his name in a stanza of the poem. In particular, the letters of his name, al-Mahdī al-Ghazāl, were strategically placed as the second letters of each word in a verse, showing the artistry and subtlety of the coding techniques.


واغفر إلاهي لمن له مدح   فيه بغرب وزنه ذا الكرم
أ ل م ه د ي غ ز ا ل
وفي ظهور يمن لها ظهرت   تزهو بأمداح سيد الأمم

**Figure 13. CAPTION Source: Azizi and Azizi 2013: P. 332.**

This is an overview of some of the ideas used by the Maghrebi, which have been further developed today with the help of new computer technologies. However, there are undoubtedly many other ideas that can be found in old documents and manuscripts, such as this document.

In the name of God alone .As communication using numerical symbols is one of the most sophisticated methods of achieving one’s aims, this document was written in such a way that it contains the names of those with whom the correspondence is conducted.

It begins with the name of the royal authority (may God protect him), followed by the ministers of the noble court and the state officials, and then continues with frequently used words.

Each person or term mentioned is assigned a specific numerical value, which is represented by the dust digits (ghubārī) written next to it. So whenever communication is required— - be it through letters or telegrams — the corresponding numerical value is recorded, and a line is drawn next to each word to distinguish it from the next (...).

Since the intended communication is not always limited to these specific terms, this document also contains all the letters of the Abjad system ( أبجد... ), each of which is assigned a unique dust number that is not used for any other purpose.

When it is necessary to write a word using these letters, the numerical value of each letter is recorded, with a dot (**.** Point) placed between the numbers to distinguish each letter.

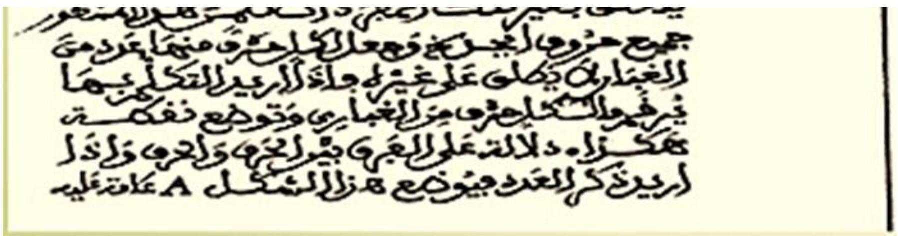
If a numerical value itself needs to be mentioned explicitly, this symbol ( ) is set to indicate it.

(محمد)Mohamed =م ( 40) ح(8 ) م (40) د (4) The numerical values of the letters are separated by dots, as here:40. 8. 40. 4.

(عمر)Omar = ع(70) م ( 40) ر (200) ع The numerical values of the letters are separated by dots, as here: 70. 40. 200.

(زيد)Zayd =ز ( 7) ي (10 ) د ( 4) The numerical values of the letters are separated by dots, as here: 7. 10. 4..

**Figure 14 The researcher's achievement**



**Document 02, Moroccan secret document on a numerical method of cryptography.(Tazi 1983: 53).**

The document that the complexity arising from the multitude of ministries, positions, and employees in various government departments, combined with the vastness of the territory and population of the Maghreb region, including the practice of mentioning names along with their fathers' names, can lead to confusion and errors due to the abundance of information. To address this challenge, the author introduces the concept of letter calculation, where each individual is assigned a unique numerical value corresponding to the letters in their name.

To illustrate this method, let us consider three names: Mohamed, Omar, and Zayd. Using the letters system, we calculate the numerical values of the letters in their names.

These numerical values are then distinguished, as mentioned in the document, by using a dot to indicate the separation between different names. This approach ensures that the numerical values, as well as the names themselves, are encoded and concealed within a digital code.

To avoid confusion or mixing of figures, the document recommends the use of a specific format (A). to distinguish between horizontal and vertical figures on the same page after the values have been totaled.

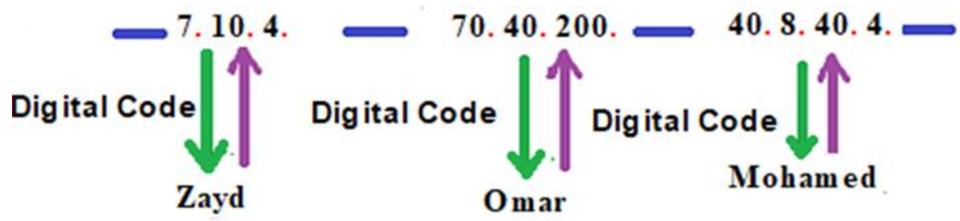



Figure 15 The researcher's achievement

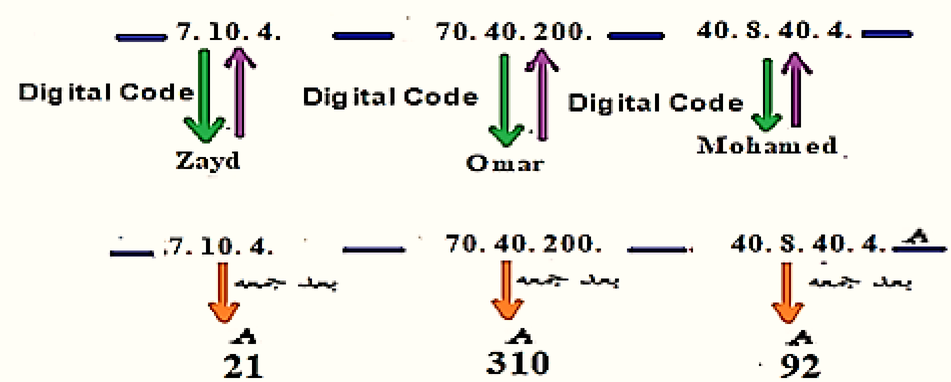



Figure 16 The researcher's achievement

If we follow this method, as described in document number 02, we can obtain the coded value for each name.

**_mohamed** : A92

**_omar** : A310

**_Zayd** : A21

The roots of cryptography and computer science among Muslims can be traced back to the 3rd century AH (9th century AD) as emphasized in historical texts (Singh, 2000: 32-33). During this period, notable figures such as Ya'qūb ibn Isḥāq al-Kindī, his disciple Aḥmad al-Balkhī and Ibn al-Durayhim al-Mawṣilī made significant advances in the field of encryption. Despite the earlier achievements of civilizations such as India, Greece and Persia in the fields of mathematics and cryptography, the Arabs and Muslims, especially those from the Maghreb, showed exceptional expertise in these disciplines.

Maghrebi scholars of the time excelled in developing advanced methods for solving complicated mathematical and astronomical problems. Their pioneering efforts led to the development of innovative encryption techniques and computational methods that generated great intellectual engagement.

This period marked a significant development in scientific research and exploration among the Muslims. The conclusions drawn from this study are as follows:

1. The inhabitants of the Maghreb region utilized an alphabetical system distinct from

that of the al-Mashriq.

2. The Amazigh and Arab populations in the Maghreb contributed significantly to the advancement of letter calculations.

3. The people of the Maghreb employed a different classification system for numerical letters compared to the Mashriq.

4. Maghrebis pioneered additional methods for information concealment and encryption, adopting a system that conceals information in a manner intelligible only to authorized individuals, emphasizing secrecy in various transactions for those seeking to protect sensitive information.

5. Emphasis is placed on the importance of adhering to the Hijri calendar and utilizing it for work and dating purposes.

# نظام الترقيم والحساب والتعمية المغاربي: دراسة تاريخيَّة ثائقيَّة

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**ملخص**

ركَّزت هذه الدراسةُ على موضوع الأرقام والأعداد والحروف بنظام حساب الجُمَل في التواصل ونقل المعلومات، وطريقة التشفير عند المسلمين في بلاد الغرب الإسلامي؛ حيث كانوا يستخدمون هذا النظام في تدوينهم للعقود والوثائق الرسميَّة، إضافةً إلى دوره الفعّال في العلوم الرياضيَّة والفلكيَّة. وتسلِّطُ الدراسةُ الضَّوءَ على كيفيَّة استخدام التشفير لحماية المعلومات السريَّة والحسَّاسة، وكيفيَّة تطوير أنظمة معقَّدة لتبادل الرسائل بطرائق مشفَّرة باستخدام منهجيَّة تحليليَّة شاملة؛ مما يعكس تقدُّم المسلمين في مجال علم الرياضة والتشفير. وتقدِّمُ الدراسةُ نظرةً شاملةً لتطوُّر هذه النظم الرياضيّة تاريخيًّا في المنطقة المغاربيَّة والعربيَّة، ولكيفية تأثيرها في الثقافة والمجتمع، ولكيفيَّة تطبيقها في مجالات مختلفة كالتجارة والاقتصاد والسياسة وفنون الأدب واللغة والشِّعر. كما تُفَكِّكُ هذه الدراسةُنماذجَ وثائقيَّةً مشفَّرةً بُغيَةَ تبيين أهميَّة الأرقام والحروف باستخدام النظام العربي الأبجدي وحساب الجُمَّل ونظام التشفير، وأهميتها في ثقافة المسلمين وحياتهم الاجتماعيَّة في البلاد المغاربية، ورجاءَ الوقوف على دورها الحيوي في تنقل المعرفة بين الأفراد والجماعات السريَّة وكيفيَّة حماية المعلومات وصيانتها.

**الكلمات الدالة:** الحروف، الحساب، التشفير، الغرب الإسلامي، الترقيم.

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