

The Reality of Translating Literary and Critical Terminology in the Era of Globalization and Artificial Intelligence.

واقع الترجمة للمصطلح الأدبي النقدي في ظل العولمة والذكاء الاصطناعي.

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submission date: 02/07/2025 Acceptation date: 02/09/2025 Published date: 15/09/2025

Abstract:

This paper seeks to examine the state of critical terminology translation, both theoretical and applied, as a vital intermediary among scholars in the literary field, particularly in the context of globalization and artificial intelligence. It is our contention that the lack of terminological consistency and the absence of a unified translation framework among critics and linguistic academies in the Arab world have impeded the anticipated progress. A genuine process of intercultural exchange necessitates a forward-looking and well-informed vision that integrates the original translated term with the translator's interpretative framework. This approach must align with the development of computational programs and the utilization of advanced technologies capable of processing and analyzing these linguistic variables, identifying emerging patterns through artificial intelligence, and applying acquired knowledge in real time.

key words: critical term, translation, acculturation, globalization, artificial intelligence.

ملخص باللغة العربية:

تسعى هذه الورقة إلى التعرف على واقع الترجمة للمصطلح النقدي بشقيه النظري والتطبيقي كوسيط حيوي، بين المشتغلين في الحقل الأدبي بشكل عام، في ظل العولمة والذكاء الاصطناعي. وفي اعتقادنا أن فوضى المصطلح، وضبابية أفق الترجمة الموحدة، بين النقاد والمجامع اللغوية في العالم العربي، هو ما حال إلى التقدم المنشود.

إن عملية المثلقة الحقيقفة، لابل لها من رؤفة اسلشراففة واعفة، لجمع بفن أصل المصطلل
المترجم، وخصوصفة المترجم، بما فحقق وفلوافق مع إنشاء البرامل المعلوماففة، واسلخدام أأأ
اللقلناف القافرة على اسلعبا تلك المعطفاا وللللها، واللعرف على مائل الأنماط المسلأأة
باسلخدام اللأاء الاصطناعف، ولطببق المعرفة المكلسبة فف فلنها.
الكلمات المفلأاففة: المصطلل النقلف، اللرلمة، المثلقة، العولة، اللأاء الاصطناعف

Introduction

The awareness of terminology in Arab critical culture is deeply rooted in history and is not merely a product of the modern literary and critical renaissance. It is widely recognized that language is a symbol of a nation's advancement, and that linguistic dynamism cannot be achieved without the dynamism of terminology, which constitutes the backbone of scientific language. Despite the importance of this notion in terms of literary appreciation in general, and critical discourse in particular, this renewed awareness is still shrouded in ambiguity.

Given the growing interest in translation worldwide, and particularly in the Arab world, numerous challenges have emerged, primarily concerning the transfer of translated terminology from its original language, such as Latin and its derivative languages (e.g., French and English), into Arabic. This assumes, hypothetically, that the transfer occurs from the "other" to "us" a process we are, in fact, compelled to accept. This dilemma is largely due to the significant lack of translated dictionaries and the absence of unified terminology among specialists, resulting in terminological chaos that confuses readers, especially since it is common to find multiple Arabic equivalents for a single term.

This paper seeks to explore this issue by addressing a set of fundamental questions: What is a translated (critical) term? How can it be identified and transferred from its original linguistic and cultural context into Arabic? What strategies can be employed in this process? And, is it possible to standardize such terminology across language academies in the era of globalization and artificial intelligence?

Terminology and the Reality of Arabic Translation

In today's world, no field of knowledge, despite its diversity and complexity, is free from a crisis of comprehension and understanding regarding the terminology in use. This crisis fundamentally stems from the theoretical plurality of the term's definitions and the variability of its practical application. It is well acknowledged among scholars that terminology is the key to every art and science. Nevertheless, there is a pressing issue that plagues most disciplines, especially the humanities,

namely, the proliferation of terms within a single field of study, a phenomenon largely caused by the rapid scientific advancements of our time. As one scholar aptly noted, "Paying close attention to terminology is the gateway to making a language capable of scientific inquiry and allowing it to fully perform its roles across fields of knowledge and creativity." (2)

Terminology is the raw material and the decisive element in the transmission of science and knowledge across various domains. Classical scholars regarded it as the gateway to knowledge, a reservoir of understanding, and a vital tool of communication among experts. It serves as a cognitive instrument that helps clarify concepts and perceptions, enabling the acquisition and comprehension of precise knowledge. Although Arabic is rich in terminology, the intercultural exchange with the "other" has stimulated dialogue, especially in the realm of contemporary Arab literary criticism. This, in turn, has created a strong need for newly coined terms to keep pace with cultural and intellectual progress.

As a result, many scholars in the critical field have undertaken the transfer of a considerable number of foreign terms and concepts, often without sufficient epistemological control or critical awareness. This has led to a range of challenges for translators, especially when attempting to carry over critical terminology from its original linguistic and cultural context into Arabic. These problems become even more complex when terms are translated from Western languages and cultural frameworks into Arabic, where they are often forcibly equated with existing Arabic concepts that may not align precisely with their original meanings or implications.

When terminology migrates from its Western environment into Arabic, it encounters a range of obstacles that prevent it from achieving its intended effect. These obstacles include the vast cultural differences between Arab and Western traditions, the failure to account for the epistemological context in which a term originated, its cultural extensions, and the neglect of the necessary conditions for accurate translation.

In addition to the inherent difficulty of translation in making complex concepts accessible to Arab readers, the multiplicity of critical methodologies, the divergence of intellectual schools, and the variance of epistemological references have all intensified the problem. This has resulted in widespread confusion in the usage of terminology and associated concepts, ambiguity in critical perspectives, and a lack of clarity in how these terms are employed within the specificities and realities of the Arab context.

The Critical Term: Concept and Importance

Linguistic Definition of the Term

The word *term* (*muṣṭalah*) in Arabic is derived from the verb *iṣṭalah* (to agree upon), which itself stems from the root letters (ṣ–l–ḥ). According to *Lisan al-Arab*, *ṣalāḥ* (righteousness) is the opposite of corruption, and *iṣlāḥ* (reform) is the antithesis of spoilage. The word *ṣulḥ* refers to reconciliation or peace. Various expressions derived from this root include *iṣṭalahu*, *ṣālahu*, *aṣlahu*, *taṣālahu*, and *aṣṣālahu*—all implying forms of agreement or reconciliation. (1)

Technical Definition

In terminological usage, the term refers to the consensus of a group of specialists within a particular scientific or disciplinary field to assign a specific meaning to a word, distinct from its general linguistic meaning, and to circulate and employ it within that field. This usage presupposes that the term's new meaning should be characterized by precision and clarity in both expression and signification.

The Relationship Between Terminology and Concept

If the keys to sciences are their respective terminologies, as previously mentioned, then concepts derive their legitimacy through the presence of terms. The relationship between terms and concepts is inherently reciprocal and complementary. As one scholar asserts: "The clearer and more coherent the concepts become, and the more they are integrated into intellectual systems, the easier it becomes to formulate consistent, coherent, and standardized terms. Terminology, in turn, enhances the precision and systematization of concepts, facilitating their reproduction, development, and susceptibility to rational critique. This further confirms the interconnectivity and vitality of the conceptual system associated with the terms, and the reverse is also true." (3)

Scientific translation plays a crucial role in shaping Arab intellectual thought in the 21st century. Its significance has grown considerably with the explosion of the information revolution that began in the last decade of the 20th century and continues into the present century. With the vast amount of scientific information being produced daily in foreign languages across the globe, it has become essential to advance scientific translation into Arabic in order to keep pace with this overwhelming flow of knowledge. Otherwise, we risk falling behind in the global race for scientific progress. Indeed, we cannot truly engage with the ongoing scientific revolution unless we do so through the language in which we think our native language.

One of the most significant challenges facing translation in general and scientific translation in particular, is the issue of terminology. Unfortunately, there is a considerable degree of terminological chaos even for a single scientific term. This can largely be attributed to the lack of

coordinated translation efforts among Arab countries, which still lack a unified system and set of standards for terminology development and dissemination.

It is no exaggeration to affirm that translation and Arabization play a pivotal role in harmonizing scientific ideas and data, fostering cross-cultural dialogue among nations, and engaging with modern civilization and its technological knowledge without forfeiting our Arab-Islamic cultural identity.

Arabic, the language that once contributed greatly to the advancement and dissemination of science across Europe, cannot be considered obsolete or incapable of keeping up with modern developments. It remains fully capable of rising to the challenge and reclaiming its place as a language of scientific thought and communication, as it once was in the past.

The Call for Terminological Unification

Numerous voices have been raised calling for the unification of terminology, particularly because the unjustified multiplicity of expressions for the same term gives the impression that we are dealing with multiple Arabic languages. While the translated term may be singular and unified in the source language, national and regional linguistic practices in the Arab world often lead to terminological fragmentation. Due to the risks posed by this linguistic phenomenon, many studies have addressed it, offering a wide range of perspectives and extensive efforts aimed at ending the terminological division among Arab linguists, an issue that has generated a state of terminological chaos and widespread confusion.

The study of critical terminology is not a recent endeavor. A survey of historical writings and specialized works that analyzed and defined a variety of terms demonstrates its longstanding roots. Among the most notable classical contributions are: *Miftah al-'Ulum* (The Key to the Sciences) by al-Sakkaki, *al-Ta'rifat* (Definitions) by al-Jurjani, *al-Kulliyat* (The Universals) by al-Kafawi, and *Kashshaf Istilahat al-Funun* (Encyclopedia of the Technical Terms of the Arts) by al-Tha'alibi, among many others. These efforts reflect the ancient Arab engagement with the codification and clarification of terminology, especially after the expansion of Arab civilization and its intellectual and artistic flourishing.

In fact, the earliest Arabic terms appeared in the Qur'an. Many of these terms had pre-existing linguistic meanings, which were redefined in light of new religious and cultural contexts. The emergence of legal-religious usage was one of the main reasons for the growth of the Arabic language and for the development of semantic shifts from earlier meanings to new meanings dictated by Islamic law and the evolving needs of life. Accordingly, the

process of creating new terms expanded with the growth of civilization and intellectual activity, contributing to the desired goal of linguistic and cognitive precision. (4)

Translating the Critical Term: The Concept of Translation

Translation has served as one of the most significant avenues enriching the field of modern and contemporary Arabic literary criticism with a wide range of terminology.

First, Linguistic Definition:

In Arabic linguistic dictionaries, *translation* (*tarjama*) carries several meanings, including: *interpreter* (*turjumān*), *explainer of language*, or someone who renders speech from one language into another. In the Hadith of Heraclius, for example, the term *turjumān* refers to the one interpreting for the emperor. According to *al-Mu'jam al-Wasit*, to translate a speech is to explain and clarify it, or to render someone else's speech into another language. The word *tarjama* may also refer to a person's biography or translated account.

From the linguistic perspective, *translation* means clarification, explanation, and transference.

- **Terminological Definition:**

Ahmad Matlub defines translation as: "Definition or explanation; it is the transfer from one language to another. The Arabs practiced it and transferred sciences from foreign languages into Arabic." (5)

Similarly, Muhammad Madani defines it as: "A cognitive activity that emerged from the human need to find a way to bridge communication between different cultural languages." (6)

Translation has also been defined as: "Transferring a foreign term into its equivalent in Arabic." (7)

It is often argued that literary translation is more difficult than scientific translation, because a literary text is not merely an idea; it also conveys the author's feelings and imagination. It is a text crafted by a poet or a skilled writer intending it to be beautiful and emotionally stirring. Therefore, the translator must produce a counterpart text that, in addition to fidelity of meaning, also preserves the aesthetic and emotional impact of the original. It has thus been rightly said: *Only a poet can translate poetry, and only a literary writer can translate literature.* (8)

Second, Translation Techniques

Translation is not merely an art or a process of linguistic transference from one language to another. Rather, it is a complex linguistic practice with its own principles and specialized techniques aimed at conveying the meaning of a text with a high degree of accuracy and fidelity.

Among the fundamental techniques of translation is the notion that the process involves various stages and procedures to which the text must be subjected as it transitions from one language to another. These techniques are typically categorized into two types: **direct translation** and **indirect translation**.

1. Direct Translation

Direct translation refers to the act of transferring a text from one language into another where there is structural or terminological equivalence. This kind of equivalence is often more attainable between closely related languages, such as those in the Indo-European family. However, as Muhammad Rachad Al-Hamzawi argues, such structural congruence is virtually non-existent between these languages and Arabic. He attributes this gap primarily to deficiencies or voids in the translator's language, which in turn leads to inconsistencies at the lexical level (9).

Direct translation includes several sub-techniques:

- **Borrowing (or Arabization):** According to Al-Hamzawi, this is a form of linguistic borrowing or Arabization, where the term or expression is transferred verbatim into the target language to fill a lexical gap. For example, the term *pragmatism* is directly borrowed as **البراغماتية** (*pragmatique*) (10).
- **Calque (Literal Translation):** This technique involves the literal rendering of phrases from the source language into the target language, sometimes producing new and unfamiliar usages. For instance, the French phrase *littérature blanche* is translated as **أبيض أدب** (11), a direct but culturally alien term.
- **Amplification (Physical Sense):** Known as "amplification in the physical sense," this occurs when more words are required in the target language than in the original source language to express the same idea. An example would be: *formal logic* translated as **"علم المنطق الصوري"** (*la logique formelle*) (12).
- **Padding (La Remplissage)**
Padding (or "remplissage") closely resembles amplification, yet differs significantly in the number of added lexical items. In padding, more words are added compared to amplification. For instance:
 - *La logique générale* is translated into Arabic as **علم المنطق العام**, where only one additional word is added.

- *La phonologie* becomes علم أصوات الكلام, where two words are added. Thus, the first example falls under **amplification** in the physical sense, whereas the second is an instance of **padding**, which introduces greater lexical elaboration (14).

2. Indirect Translation

Indirect translation comprises three main techniques:

Equivalence (Équivalence)

According to Al-Hamzawi, equivalence involves conveying the original term using a different expression that reflects the intended meaning. For example:

- *Allongement vocalique* is translated as إشباع الحركات.
- *Semi-voyelle* becomes أشباه أصوات اللين (15).

Adaptation (Modulation or Reformation)

This refers to using a specific term from the target language to express a concept originally formulated in a different language. For instance:

- *Infinitif* is rendered as مصدر.
- *Préfixe* is also translated as مصدر, though it carries a different grammatical function in French. This demonstrates the use of context-specific adaptation.

Reformulation (Modulation)

Reformulation implies a renewal or break with traditional and historical concepts. Its terms are not extracted from dictionaries but are often **coined by translators** themselves to convey newly emerging concepts. One such example is:

- *L'axe de sélection* translated into Arabic as محور الاختيار (12).

Summary: Approaches to Translation

Translation may be:

- **Literal (word-for-word),**
- **Semantic (meaning-based),** or
- **Hybrid,** combining both methods.

This is especially relevant when translating highly condensed and knowledge-rich foreign terminology (16).

Translation, it is widely agreed, is a deeply human intellectual activity, rooted in ancient history. Without this interplay and interlinguistic fertilization, it would have been impossible to communicate with and access the cultural heritage of other civilizations, such as Latin, Indian, or Persian cultures. Translation thus plays a vital role in cultural dialogue and in bridging the gaps that exist between civilizations (17).

The Critical Term: Models and Dilemmas

Translation remains one of the most pressing issues in the field of modern Arabic critical studies. Any distortion in understanding or inaccurately

translating a critical term inevitably leads to misconceptions of the intended scientific or theoretical concepts.

The dilemmas associated with translating and formulating critical terminology, especially in standardizing such terms have long challenged researchers in the Arab world. Many scholars have concluded that **there exists a real crisis in Arab intellectual culture**, which is fundamentally linked to the lack of control and clarity over terminology and conceptual frameworks. It is a deeply rooted challenge that continues to burden anyone engaged in this field of research.

Although translation is the primary method for transferring these terms across languages, the **Arab critical landscape is plagued by terminological disorder**. As one scholar notes:

"A brief glance at the available terminologies, whether produced by individual or collective efforts, reveals a staggering volume of inconsistent terms that only deepen the reader's confusion. This situation confirms that the state of translation in the Arab world is marked by stagnation and chaos. The translation of critical terminology, in particular, has created a storm of tension and disorder" (16).

This suggests that the **problem of critical terminology is constantly rekindled** with the emergence of new literary and intellectual challenges. Despite the existence of a vast Arab critical heritage, amounting to more than 1,500 classical Arabic literary terms, this richness has often been ignored.

The neglect of Arab literary tradition, combined with limited or superficial engagement with foreign literature, contributes significantly to the current crisis. Many of those engaging in literary criticism:

"...are unaware of the historical and cultural contexts in which these terms originally emerged. They have insufficient exposure to foreign literary theory to grasp the meanings of modern critical terms accurately. Instead, they rely on second-hand commentaries and popular articles, which only lead to further confusion and misinterpretation" (4).

In this paper, we aim to examine some of the **key critical terms** that have undergone considerable variation and controversy in formulation and precise definition. These terms are foundational to literary and critical discourse and demand a re-examination of their origin, use, and current interpretations.

Structuralism is derived from the word *structure*, a term spelled identically in both English and French (*structure*) and in Latin (*structura*). As for *construction*, its spelling also remains consistent across French and English, although its pronunciation differs (16).

Numerous Arabic equivalents have been proposed for this foreign term, including: **al-binā'iyya** (البنوية), **al-bunā'iyya** (البنوية), **al-binā'iyya al-binyāniyya** (البنائية), **al-bunawiyya** (البنوية), **al-bunyāniyya** (البنائية), **al-binyā** (البنية), **al-haykaliyya** (الهيكلي), **al-haykalāniyya** (الهيكلانية), **al-tarkībiyya** (التركيبية), and **al-wazīfiyya** (الوظيفية). All of these have been used as translations of the term *structure*.

For instance:

- *Structure* has been translated into Arabic by various scholars as:
- **Turkīb / Binyā** – by **Mohammed Ali Al-Khouli**
- **Binyā (singular) / Hayākil (plural)** – by **Munsif Ashour**
- **Haykal / Binyā** – by **Al-Masdi, Samir Marzouq, and Jamil Shakir**

Similarly, the term *Structuralisme*, referring to the critical methodology; has seen multiple renderings in Arabic. The most common and widespread translation is **al-binā'iyya** (البنوية) (with a kasrah on the “b”), used by well-known critics such as **Abd al-Karim Hassan, Abdullah al-Ghadhami, Yumna al-Id, Sami Suwaydan, Kamal Abu Deeb, Abd al-Aziz Hammouda, and Jabir Asfour**.

Other variations include:

- **al-binā'iyya** (البنائية) – used by **Salah Fadl**
- **al-bunawiyya** (البنوية) – used by **Abd al-Malik Murtad and Abd al-Rahman Hajj Salih (may Allah have mercy on them)**
- **al-haykaliyya** (الهيكلي) – by **Hussein al-Waad**
- **al-tarkībiyya** (التركيبية) – by **Magdi Wahba** (16)

This abundance of equivalents and overlapping usages, while reflective of individual scholarly efforts, has led to what critic **Youssef Waghliassi** termed a “terminological mess” and described as “poor quality” translations. He argued that most of these terms diverge from the concept's essence and original intent. However, he exempted the terms “**al-bunawiyya**” and “**al-binyiyya**”, considering them more accurate in both linguistic and semantic terms, and closer in equivalence to the original French term *Structuralisme*.

Semiology and Semiotics (Sémiologie / Sémiotique): Origins and Arabic Equivalents

The **semiotic approach** is generally classified among post-structuralist methodologies, although its conceptual and methodological foundations can be traced back to structuralism. The Swiss linguist **Ferdinand de Saussure** is widely regarded as its founding figure.

Recent studies suggest that the root of the word *sémiologie* or *sémiotique* is found across multiple ancient languages, including **Hebrew, Syriac, Greek, and Arabic**. Its original Greek form is *sémion*, which denotes a **sign, indication, trace, clue, or marker**. The Greek root *sēmeiōtikē* refers to **the study of signs**.

Some scholars argue that the term has an Arabic etymological origin as well, tracing it to the Arabic root **s-w-m (سوم)**, which appears in classical Arabic dictionaries. In particular, Algerian scholar **Abd al-Malik Murtad** (may he rest in peace) deeply investigated the term's linguistic roots in Arabic. He concluded that the most accurate Arabic equivalent of "semiotics" should be **al-sīma (السيمة)** or **al-sīmawīyya (السيمانية)**, derived not from **al-taswīm (التسويم)**, which means to brand or mark with fire, but from **al-wasm (الوسم)**, meaning to **stamp, mark, or impress** (18).

Hence, the Arabic term "**al-sīma**", when derived from **al-wasm**, is more faithful to the semantic load of the Greek *sémion*, aligning both linguistically and conceptually with the foundational ideas of semiotics.

Semiology and Semiotics

In addition to its presence in the Qur'an as meaning "a sign," as in the verse: **﴿ يُعْرَفُ الْمُجْرِمُونَ بِسِيمَاهُمْ فَيُؤْخَذُ بِالنَّوَاصِي وَالْأَقْدَامِ ﴾** [Ar-Rahman: 41], **The criminals will be known by their marks, and they will be seized by the forelocks and the feet** [Ar-Rahman: 41],

the term has been translated into Arabic in various ways, including: **Semiology and Semiological Studies** – used by: Salah Fadl, Abdullah Al-Ghadhami, Mohamed Anani, Said Alloush, Abdelmalek Mortad, Abdelaziz Hammouda.

Semiology was also employed by Mohamed Azzam; **Science of Semiology** and **Simatiyyah** were used by Abdelaziz bin Abdullah (16).

When examining the naming of the term "semiotics" in Arabic, there is a notable overlap between the French terms *sémiologie* and *sémiotique*, both of which have been translated inconsistently.

A live example of the multiplicity and variation of translations can be illustrated as follows:

- Abdel Salam Al-Massadi: **Science of Signs** (*Stylistics and Stylistics*, p. 412)
- Mubarak Hanoun: **Semiotics** (*Lessons in Semiology*, p. 46)
- Magdi Wahba: **Symbolism** (*Dictionary of Literary Terms*, p. 406)
- Mohamed Azzam: **Semiology** (*Stylistics as a Critical Method*, p. 441)
- Ali Al-Qassem and others: **Science of Symbols** (*Dictionary of Modern Linguistic Terms*, p. 12)
- Abdelmalek Mortad: **Semiological Studies** (*Dictionary of Contemporary Literary Terms*, p. 6)

What is evident from these translations is that the single term has acquired multiple and diverse Arabic renderings, varying from one researcher to another. This has led to a level of terminological confusion that prevents the reader from settling on a single convincing designation. As a result, "... the reader becomes entangled in a field of translated terms dominated by subjectivity. In many cases, each translator prefers to retranslate the term due to dissatisfaction with existing versions. Consequently, every translator ends up with their own set of terminology" (19).

Artificial Intelligence and Translation

Since the second half of the twentieth century, technology has permeated various aspects of human life, triggering a major epistemological revolution that affected all fields and disciplines, particularly languages, which serve as the primary vessels for knowledge preservation and transmission. In light of this new intellectual development, **language digitization** became inevitable, aiming to adapt languages to modern communication tools. This led researchers to explore what is now known as **language engineering**, or **machine language**.

As a result of this new scientific reality, based on the creation of artificial intelligence and its employment to assist humans in overcoming challenges related to communication, learning, and other domains of human activity, it has become essential to recognize and invest in this reality in ways that benefit the field of language, whether in scientific or literary contexts.

Undoubtedly, like other world languages, the Arabic language has benefitted from artificial intelligence, which has become intertwined with virtually every aspect of modern life. The path of artificial intelligence in **natural language processing (NLP)** falls under what is known as **linguistic engineering**. This involves the computational processing of natural languages and encompasses areas such as **terminology sciences**, **machine translation**, **text mining**, **sentiment analysis**, and **corpus compilation and processing**, as well as the enhancement of **search engine functionalities**. This field requires a combination of **linguistic** and **computational competencies**, enabling researchers to automate the analysis of languages by subjecting linguistic phenomena to algorithmic processing. With the help of artificial intelligence, Arabic has entered the domain of digital communication through **mobile applications programmed in Arabic script**, and AI has contributed to **analyzing and mapping websites**, **city navigation using audio-visual tools**, and the programming of **Arabic-speaking devices** in cars, trains, and other machines.

Among the most prominent fields that heavily rely on artificial intelligence applications is the **Internet**, which has become a life necessity. Arabic has

benefitted from its applications in various domains, particularly in **social media communication** (20).

The Arab user today employs various applications such as **email, Facebook, Twitter, Snapchat, and Messenger**, among others. These platforms are also used extensively by researchers and learners for **scientific research, self-learning, and distance education**.

The most significant benefit that the Arabic language has gained from artificial intelligence applications is evident in the domain of **automated language processing**, which occurs at several levels, including:

- **Digital writing level,**
- **Speech processing,**
- **Phonological system processing,**
- **Lexical system processing,**
- **Morphological, syntactic, and semantic system processing,** among others.

The **computational processing of the Arabic language** dates back to the **1970s**, when **Ibrahim Anis** visited Kuwait University and proposed an idea to **Ali Helmy Mousa**, a theoretical physicist, to use the **computer to statistically analyze the root letters of Arabic words** in order to better understand the structure of Arabic lexemes. This pioneering computational analysis was published in **two volumes in 1971 and 1972**, where the researcher used a computer to **catalogue trilateral and non-trilateral roots in Al-Jawhari's lexicon "Al-Sihah"** (21).

Numerous **conferences and symposia** have been held across the Arab world, both in the East and the Maghreb, dedicated to the computational processing of the Arabic language. Among the earliest of these were the sessions of the **training course held in Rabat in 1983**, followed by another symposium in **Kuwait in 1985** focused on the **use of Arabic in computing**. Since then, interest in **Arabic language computing** has grown extensively, reaching universities and international organizations in **Europe and the United States**.

In the Arab world, several **associations** have been established that focus on **Arabic language engineering** and the **promotion of digital culture**, often in collaboration with computing institutions such as **technical colleges and applied science institutes**. In addition, **private companies** (23) specializing in software development have contributed significantly to the advancement of tools that link the Arabic language with various computational fields such as:

- **Phonetic, morphological, syntactic, and semantic computing**
- **Machine translation**

- **Internet applications**
- **Digital libraries**
- **Search engine technologies** connected to administrative, economic, and scientific fields related to Arabic language processing.
These efforts have resulted in the development of several prominent programs aimed at **Arabic language computational processing**, including:
 - **Arabic Thesaurus/Corpus Creation:** Focused on storing databases of texts and systematically cataloguing all available branches of knowledge using scientifically rigorous and internationally recognized methodologies, enabling data retrieval for classification and computational analysis.
 - **Development of Electronic Dictionaries:** Aimed at defining and encoding Arabic vocabulary computationally.
 - **Automated Morphological Analyzer:** Designed to identify the **structure of Arabic words**, their **morphological forms**, and **structural features**.
 - **Automated Syntactic Analyzer:** Focuses on modeling and computing the **syntactic structures** of Arabic language, parsing sentences, and correcting grammatical errors.
 - **Automatic Diacritization and Grammatical Annotation:** A tool for computationally managing the **diacritical system** of Arabic script. This program has played a vital role in the **diacritization of the Qur'an, Hadith, and classical Arabic texts**.
 - **Automated Proofreader:** Designed to correct **orthographic, morphological, and syntactic errors** in written Arabic.
 - **Automated Classifier:** Used for **automatic classification and documentation** of texts, analyzing their sources stored in large databases, and providing **statistical data**.
 - **Automated Indexer:** Focused on the **indexing of books** through keyword extraction or by generating document summaries using **statistical analysis** and **frequency measurement** of keywords in the analyzed text.

Proliferation of Machine Translation Programs

In recent years, numerous **machine translation programs** have emerged (24). Among the most prominent are:

- **Al-Naqil Al-Arabi (The Arabic Translator):** This was the **first program developed by the SAKHR subsidiary "Cimos"**, and is considered one of the early **bilingual electronic dictionaries**, particularly for **Arabic-French** and **Arabic-English** translation. *Al-Naqil Al-Arabi* specializes in **technical translation across various fields**; commerce, finance, and informatics, utilizing specialized dictionaries. The program operates on five linguistic levels:
 1. A database of pre-translated texts

2. Morphological analysis
 3. Syntactic analysis
 4. Semantic analysis
 5. Transformation phase
- **Sakhr Software** (a leading Arabic technology company) developed several programs, notably:
 - *The Automatic Reader*,
 - *Text Formatter*,
 - *Morphological Analyzer*,
 - *The Arabic Digital Dictionary*,
 - And conversational computing applications including: **Sindbad 1**, **Sindbad 2**, **NasherNet**, **Al-Idrissi**, and **Al-Daleel**.
 - The **Regional Institute for Computer Science and Telecommunications in Tunisia** has also developed significant programs such as:
 - *Adib*: An extensive multilingual computerized dictionary for **Arabic, French, and English**.
 - *Tarjuman*: A program dedicated to **machine translation**, among other linguistic applications.
 - **King Abdulaziz City for Science and Technology (KACST)** and its **Information Center** have played a central role in creating **specialized databases** for Arabic terminology, translated texts, scientific works, and dictionaries.

Conclusion

It has become evident that artificial intelligence represents a new scientific revolution that nations can no longer afford to ignore. Engaging with it, understanding its mechanisms, and harnessing its potential are now necessities. For this reason, scientists and researchers in advanced Western universities are diligently working to develop AI applications with a future-oriented vision that may transform human lifestyles and roles across the globe. This science aspires to surpass human capabilities and replace them with artificial beings namely, robots. However, the reality of translation under the paradigm of artificial intelligence is still in its infancy compared to what exists in Western countries, despite the efforts made by various institutions and the conferences held in this regard.

Perhaps the greatest obstacle facing the future of unified translation in the age of AI is the diversity of translators' backgrounds and their ideological and intellectual orientations, coupled with their lack of commitment to an objective vision that considers Arab specificities and the broader cultural context of the region.

Another major challenge lies within digitization itself, namely the insufficient presence of the Arabic language on the Internet. This limits its potential, especially under the overwhelming influx of other languages, particularly in the fields of terminology development, education, and scientific research, where foreign languages, mainly French and English still dominate.

A further challenge is the lack of effective coordination between the relevant institutions, among which are: the Simos Company in France, the National Informatics Center in Tunisia, Systran in France, the Institute of Applied Technologies in Washington, Sakhr Company in Cairo, the Electronics and Computer Research Institute at King Abdulaziz City for Science and Technology, the Arabization Coordination Bureau in Rabat, the Center for Studies and Scientific Research, and the Higher Institute for Applied Sciences and Technology in Syria.

There is also a pressing issue in the separation between training and educational programs in computing and linguistics. Most Arab universities and institutes continue to treat these fields independently, and very few institutions offer academic programs that integrate both linguistic and computational expertise.

Looking at the current status of the Arabic language and its future prospects, it is clear that its advancement is closely tied to artificial intelligence and the applications that aim to digitize Arabic and process its linguistic levels using various modern methods. This direction has become a necessary course dictated by the current digital scientific revolution led by AI, which has permeated all areas of life.

However, these aspirations still require substantial research efforts in other areas, such as pragmatics, textual analysis, corpus development and digitization, and improving the quality of machine translation. These domains represent genuine challenges that researchers must address in the pursuit of enhancing Arabic language computing in service of translation and Arabization.

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