Strategies of Rendering Metaphor from Arabic into English: A Comparative Study of ChatGPT and Matecat

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Abstract

This study examines the translation strategies employed in rendering Arabic metaphors from Naguib Mahfouz's *Zuqāq al-Midaq* into English, comparing the approaches of a human translator with those of two machine translation systems: ChatGPT-4 and Matecat. Drawing upon Nida's (1964) theory of formal and dynamic equivalence, the research analyzed 106 metaphors to identify predominant translation strategies. The findings reveal that the human translator consistently adopted dynamic equivalence, effectively re-creating the metaphorical meaning and cultural nuances for the target audience. In contrast, while ChatGPT-4 demonstrated a notably higher tendency towards dynamic equivalence compared to Matecat, both machine translation systems still frequently resorted to formal equivalence, resulting in more literal or less idiomatic renditions. This indicates that, despite advancements, machine translation, including advanced large language models (LLMs), continues to face significant challenges in accurately conveying the subtle complexities of figurative language. The study highlights the indispensable role of human translators in achieving nuanced and culturally sensitive metaphorical translations while also underscoring the potential of advanced AI tools to enhance the translation process when complemented by human expertise.

Keywords: ChatGPT-4 translation, Matecat translation, machine translation, translation quality, metaphor

1. Introduction

The modern world is currently undergoing an unprecedented period of technological growth characterized by the rapid emergence of innovative tools and systems. These developments are reshaping how we work, live, and communicate. Within the field of translation, this development is having a profound impact, prompting significant advancements across various areas of expertise. In particular, the emergence of Large Language Models (LLMs), Machine Translation (MT), and Computer-Assisted Translation (CAT) tools enhanced and impacted the speed and accuracy of translation processes. Today, Artificial Intelligence (AI) plays a pivotal role in translation, significantly enhancing the effectiveness and precision of CAT (Abdelhalim et al., 2025). Although MT has made significant advances, it still struggles with the nuanced complexities of figures of speech, such as metaphor. Poibeau (2017) states that, naturally, the goal of MT is to provide the most accurate translation possible, rather than dealing with poetry and literary works, which is considered a difficult task, and that existing systems are still far from satisfactory.

Translation is a communication tool that can break down cultural, normative, and belief barriers between any two primary languages (Khader, 2023). Metaphor translation has long been seen as a difficult task for translators due to the inherently figurative nature of metaphors, which rely on implicit comparison rather than literal meanings. Therefore, creating an accurate and culturally sensitive translation for the target audience requires a deep understanding of both the source language (SL) and the target language (TL), along with their respective cultural contexts. However, MT systems, especially those that have not been trained on a large dataset rich in metaphors, often produce literal translations, generating awkward or misleading output. According to Laylo (2024), translating metaphorical expressions remains a challenging and elusive task for automated systems since they are deeply rooted in language and society. Abushihab (2015, p. 170) states, "A text is meaningful because there is a continuity of senses among the ideas stated in it." Several studies have addressed the problems and strategies for translating metaphorical expressions (Al-Jarf, 2023; Ashuja'a et al., 2019; Beikian et al., 2023; Khasawneh et al., 2025).

Meanwhile, other studies focused on evaluating the performance of MT systems in translating different types of texts. Alsharif and Khasawneh (2025) evaluated MT performance on figurative language by combining strategy analysis with BLEU scores and length ratio metrics. Meanwhile, Aldawsari (2025) investigated the performance of LLM models in translating Arabic lexical ambiguities in comparison to traditional MT systems. AlAfnan (2025) analyzed and compared the effectiveness of LLMs against traditional MT tools. Ghassemiazghandi (2024) evaluated the translation capabilities of two MT systems for Persian-to-English translations, highlighting the effectiveness of OpenAI's LLMs in enhancing MT accuracy.

In contrast to previous works, this study aims to investigate the translation strategies employed when translating metaphors from Arabic into English using two MT systems. Accordingly, this study aims to answer the following questions:

1. How do machine translation tools (ChatGPT-4 and Matecat) render Arabic metaphors into English?

2. What translation strategy do machine translation tools predominantly utilize for translating Arabic metaphors into English, based on Nida's (1969) theory of equivalence?

3. To what extent do the translation strategies differ between the human translator and the two machine translation tools?

2. Literature Review

Machine Translation

MT is the translation of a text from one language into another using computer software. This concept was first introduced by Warren Weaver in 1947, only a year after the development of the first computer. MT functions through the sequential analysis, transformation, and synthesis of language structure into a format suitable for the target TL (Okpor, 2014). This process is fully automated, from the source text (ST) to the target text (TT), with no human intervention during the translation process. It relies on specialized programs, dictionaries, and linguistic rules. However, it may involve pre-processing, which refers to preparing the text for the MT system without interfering with its linguistic analysis capabilities, or post-editing, which refers to the human revision of the machine-translated output after the MT system has completed its work. CAT tools encompass both human-assisted and machine-assisted approaches (Hutchins, 1995); they refer to software that simplifies the translation process by helping translators avoid mistakes, reuse previously translated words, and consistently utilize terms. The key difference between MT systems and CAT tools lies in their core roles: MT systems produce translations automatically, either on their own or with minimal human assistance, whereas CAT tools are designed to assist human translators by enhancing consistency and efficiency.

There are two types of MT systems, which depend on their methodology: the rule-based approach and the corpus-based approach. In the rule-based approach, bilingual dictionaries and manually written rules are employed to translate SL text into TL text (Wang et al., 2022). On the other hand, in the corpus-based approach, the ST is translated by analyzing similar sentence pairs from a bilingual parallel corpus built by human experts. Translation can be a very challenging task due to the language's nature, richness, and ambiguity. Therefore, translation requires linguistic proficiency in both SL and TL, in addition to contextual awareness. Craciunescu et al. (2004) state that both MT systems and CAT tools fail to produce efficient and accurate translations, thereby eliminating the need for human translators.

Metaphor

Metaphor is a technique that is used to compare two different things or to convey an idea that is not literally true without using "like" or "as." Knowles and Moon (2005, p. 2) state that a metaphor is "the use of language to refer to something other than what it was originally applied to, or what it 'literally' means, to suggest some resemblance or make a connection between the two things." Metaphors are usually considered a challenge for translators; Larson (1998) has mentioned several reasons for that: a) the metaphor image might be unknown in the TL; b) the object and point of similarity of metaphor are implicit or hard to identify; c) the TL uses a different image for comparison; d) metaphor usage varies in frequency. Leech (2014) points out that metaphor is far less limited than simile because it includes countless possible meanings at a rapid pace. According to Newmark (1988), cultural metaphors, which have a cultural connotation, are more challenging to translate than universal metaphors. Several procedures have been presented by Newmark (1988) to translate metaphors: reproducing the same image in TL; translating metaphor by simile; converting the metaphor into sense; combining the same metaphors along with its sense; deleting the metaphor, translating metaphor as simile along with its sense; replacing SL image with a standard TL image.

ChatGPT and Matecat Machine Translation

AI has garnered worldwide attention since the development of computer systems capable of performing tasks that typically require human intelligence, such as learning, observation, and decision-making. Chat Generative Pre-trained Transformer, also known as ChatGPT by OpenAI, has become a landmark of LLMs that is capable of generating human-like text and performing various language-based tasks, such as writing, summarizing, and even translating different texts. ChatGPT is trained on a corpus of textual data, enabling the model to identify and understand patterns as well as the relationships between words, phrases, and sentences (Kalla et al., 2023). When it comes to translation, ChatGPT has demonstrated impressive translation abilities. Jiao et al. (2023) indicated that ChatGPT displayed a higher level of performance than Google Translate. Meanwhile, Ghassemiazghandi (2024) demonstrates that ChatGPT-4 translation surpasses Matecat, a web-based CAT tool, and is nearly as good as human translations. However, ChatGPT has several drawbacks, including poor accuracy, reliance on high-quality input, a lack of human interaction, and privacy issues (Mukhtar, 2025). Since ChatGPT lacks the ability to reason and evaluate information, particularly in literary, historical, and legal texts, it may present incorrect or misleading information and alter the original text's meaning (Khoshafah, 2023).

While LLMs like ChatGPT represent the cutting edge of AI-driven text generation and translation, CAT tools like Matecat remain commonly used among professional translators due to the features they provide and their structured workflows. In contrast to generative AI, which generates text using probabilistic methods, CAT tools facilitate the reuse of previous translations, simplify file handling and publication, and standardize the translation process (Torres-Hostench et al., 2010). Accordingly, Matecat seeks to enhance how humans and MT are integrated inside the CAT architecture (Federico et al., 2014). However, like other translation tools, Matecat has its own

disadvantages. It requires a constant internet connection, may not have all the sophisticated capabilities found in more expensive applications, and may experience issues with consistency and file size limits. Additionally, Matecat may be inefficient in the project's final stages (Karpina, 2024).

Related Studies

Several studies have demonstrated that translating metaphors is a challenge that faces both theorists and practitioners. In their study, Farghal and Mansour (2020) analyzed the translation of Arabic metaphorical expressions into English through a dual quantitative and qualitative analysis of the literary genre. They aim to analyze the coding of such metaphors (concrete-to-abstract vs. concrete-to-concrete borrowing), the translation procedures employed, and the paradigmatic (lexical creativity) treatment of metaphors. The researchers found that most involved concrete-to-abstract conceptual borrowing rather than concrete-to-concrete. In addition, four translation strategies were identified: maintaining the original metaphor, modifying it, semaphoring, and changing it entirely. The study highlights that literary metaphors are essential to the text's aesthetic and semantic value, and it emphasizes the significance of maintaining its syntagmatic (structural) and paradigmatic (lexical inventiveness) characteristics.

Ashuja'a et al. (2019) investigated the translation strategies employed by students when translating scientific metaphors from English into Arabic. The literal technique was the most used strategy of the eight translation strategies they identified, while explication was the least. Due to time constraints and a lack of expertise with metaphorical structures in both languages, it may be challenging to identify matching Arabic metaphors, as evidenced by the prevalence of literal translations. The study emphasizes the need for a more thorough comparative analysis and targeted training to help students become more proficient in using scientific metaphors.

The MT evaluation has been emphasized by several studies, which have included both empirical and theoretical discussions. Tang and Moindjie (2024) examine the translation of grammatical cohesion in English-Chinese legal texts, comparing human translators with ChatGPT-4. According to the qualitative analysis based on Toury's (2012) descriptive framework, the researchers found that human translators outperform ChatGPT-4 in handling legal references, particularly in terms of accurately using formal language, understanding target language norms, selecting appropriate expressions, and applying the correct translation methods.

Ghassemiazghandi (2024) compared ChatGPT-4's performance with that of the open-source tool Matecat in evaluating translation accuracy from Persian to English, using BLEU scores. The study revealed that ChatGPT-4 surpasses Matecat and that ChatGPT-4 translation nearly matches the quality of human translations. The study highlights how AI-driven solutions can help bridge the gap between human and machine translation, especially in complex language pairs. Meanwhile, Ali (2020) evaluated the quality of three MT tools (Google Translate, Microsoft Bing, and Ginger) for English-Arabic translations using United Nations texts. According to fidelity (precision) and intelligibility (clarity), none of the translations were found to be perfectly accurate. Microsoft Bing performed best, followed by Ginger, while Google Translate had the highest error rates. According to the results, these tools can provide a broad comprehension of the original text; however, for complete correctness, extensive post-editing is necessary.

Abdelaal and Alazzawie (2020) studied the accuracy of Google Translate in translating informative Arabic news texts from Arabic to English, measuring the translation errors and assessing the output quality. Using a mixed-methods approach, the authors analyzed the data guided by Hsu's (2014) classification of machine translation errors and evaluated fluency/semantic adequacy with established metrics. They found that omission (lexical error) and inappropriate lexical choice dominate Google Translate's shortcomings. According to the study's findings, machine translation systems can help speed up the translation process. However, accuracy is compromised in favor of convenience (less work for humans) and speed.

3. Material and Method

This research employs a mixed-methods approach, combining both qualitative and quantitative procedures to answer the research questions and provide a comprehensive understanding of the research problem (Creswell & Creswell, 2017). It aims to examine the translation strategies employed when translating metaphors from Arabic into English using two MT systems, ChatGPT-4 and Matecat, in comparison to human translation. A total of 126 metaphors were identified in the Arabic novel Zuqāq al-Midaq (Midaq Alley), written by Naguib Mahfouz and published in 1947. This novel is selected for its linguistic richness and cultural depth. At the same time, metaphors are selected since they entail " a complex interplay of numerous linguistic and extra-linguistic factors" (Hong & Rossi, 2021).

The identified Arabic metaphors were input into two MT systems: ChatGPT-4 and Matecat. Meanwhile, the English translation of Trevor Le Gassick is selected as a human reference. Metaphors that were not translated by the human translator in the selected English translation of the novel were excluded to ensure a focused analysis of translation choices rather than non-translation. In addition, this method ensures that all analyzed metaphors have a corresponding English translation for comparison across all three agents. Therefore, 106 metaphors were analyzed.

The three translations of the selected metaphors were systematically analyzed and classified according to Nida's (1969) equivalence theory. To clarify, each metaphor translation is assessed to determine whether it exhibits formal equivalence or dynamic equivalence in relation to the original Arabic metaphor. The classification process involved a careful comparison of each Arabic metaphor with its corresponding English translation, utilizing ChatGPT-4, Matecat, and a human translator. This allows a systematic evaluation of the translation strategies employed by each agent, which also reveals differences in their tendencies towards literalness or naturalness in metaphorical translation.

4. Results

The following table compares the translation strategies employed by human translators, ChatGPT-4 and Matecat, based on Nida's Equivalence Theory. While formal equivalence is a more literal, form-oriented translation that preserves the grammatical structure and lexical fidelity, dynamic equivalence is a sense-for-sense translation that prioritizes conveying the original message naturally in the target language, aiming to produce the same effect on the target audience.

Table 1. The Percentages of Strategies Observed in the Human Translation Vs. ChatGPT-4 and Matecat Adopting Nida Equivalence Theory

No.	Strategy	Human Translator	ChatGPT-4	Matecat
1	Formal Equivalence	7.54 %	32.07 %	43.39 %
2	Dynamic Equivalence	92.45 %	67.92 %	56.6 %

According to Table 1, the human translator favors dynamic equivalence (92.45%). This is because human translators tend to prioritize natural-sounding nuances and cultural context, specifically in literary texts. ChatGPT-4 also employs more dynamic equivalence (67.92%), but formal equivalence (32.07%) is significantly higher than that of human translators. ChatGPT, in general, is trained on a large corpus that often imitates natural language, but it might be more cautious and retrain structure than a human translator would. Meanwhile, formal equivalence (43.39%) is the highest among all three systems in Matecat, while dynamic equivalence (56.6%) is the lowest. MT tools like Matecat prioritize structural accuracy and typically translate word by word or phrase by phrase.

Table 2. Length Ratio of the Three Translations

	AI tool	Length ratio
1	Human Translator	1
2	ChatGPT-4	1.13
3	Matecat	1.04

The table above compares the length ratio of ChatGPT-4 and Matecat to that of a human translator. ChatGPT-4 has a length ratio of 1.13, meaning that its translation is 13% longer than the human translation. This could be due to the AI tool's tendency to include more words to ensure fluency. Meanwhile, Matecat shows a length ratio of 1.04, which indicates that its translation is 4% longer than the human translation. As an MT tool, Matecat often opts for a literal translation, resulting in a slightly longer translation due to its rigid adherence to the ST structure. However, Matecat is closer to the original length than ChatGPT-4.

5. Discussion

This section examines the translation strategies employed to convey metaphors and their effectiveness in conveying meaning. Several examples are presented to provide a rich, nuanced, and verifiable understanding of the findings.

Example 1

Source Metaphor أو ابتلاع السجن لرجل من رجالاته.

	Translation	Translation Strategy	Length Ratio
Human Translator	…or one of its menfolk was swallowed by the prison.	Formal Equivalence	1
ChatGPT-4	Or the prison swallowing one of its men	Formal Equivalence	0.80
Matecat	Or swallowing the prison of one of his men	Formal Equivalence	0.90

In the above example, the metaphor compares the prison to a person who swallows things, which is a common but challenging element for translation. All three translations (human, ChatGPT-4, and Matecat) are classified under formal equivalence, meaning they retain the original meaning literally, preserving the form rather than adapting it culturally or idiomatically. The human translator prioritized meaning and fluency, using passive voice to achieve a formal and smooth narrative flow. ChatGPT-4 translation is more direct, maintaining the literal meaning of the metaphor. Moreover, its translation is 20% shorter than the human translation due to grammatical restructuring (active vs. passive) and lexical choices.

Meanwhile, Matecat referred to literal translation. However, its translation is slightly awkward and grammatically ambiguous, which might be the result of misparsing. Matecat translation is 10% shorter than the human translation, yet it lacks clarity. Even with the same strategy, the three translations vary. The human translation seems more natural, while MT outputs are slightly more literal and awkward.

Example 2

Source Metaphor تلوح في جسمها وروحها آثار السهام التي سددها إليها الدهر.

	Translation	Translation Strategy	Length Ratio
Human Translator	Her body and mind reflected fate’s scars.	Dynamic Equivalence	1
ChatGPT-4	She bears in her body and soul the marks of the arrows that fate has shot at her.	Dynamic Equivalence	2.25
Matecat	There are traces of arrows in her body and soul that were shot at her by eternity.	Dynamic Equivalence	2.13

Example 2 illustrates an abstract metaphor that compares life's struggles to physical wounds. All three translation agents used dynamic equivalence in an attempt to produce a translation that is more natural and impactful to the target audience rather than producing a literal translation. However, the human translation is more concise, idiomatic, and poetic. Both ChatGPT-4 and Matecat translations maintained

the ST literal image "arrows shot by fate/ eternity," and it is more of an explanation rather than recreation. While their translations are accurate in meaning, they are significantly longer and less poetic than the human translation. ChatGPT-4 is 125% longer than the human translator, and Matecat is 113% longer. This indicates that even when MT systems adopt a dynamic equivalence strategy and accurately convey the meaning, their translations may fall short in terms of stylistic elegance and conciseness.

Example 3

Source Metaphor كيف اطلقت على لسانك الطويل بسبب جلباب!

	Translation	Translation Strategy	Length Ratio
Human Translator	Do you remember all that fuss you made about a dress?	Dynamic Equivalence	1
ChatGPT-4	How did you let a long tongue be mentioned because of a robe!	Formal Equivalence	1.18
Matecat	How you shot yourself in the long tongue with a jilbab!	Formal Equivalence	1

In example 3, the metaphor has a figurative meaning; it describes someone who speaks excessively or rudely about something unimportant (a jilbab or dress). The human translator used a dynamic equivalence strategy, replacing the metaphor with an idiomatic expression. Although the translation loses the metaphorical imagery of "long tongue," it effectively reflects the core idea and makes it easier for readers to understand. ChatGPT-4 attempts to strike a balance by using formal equivalence. It maintains the metaphor; however, the translation is unnatural and confusing, although it is 18% longer than the human version. Matecat's translation has a similar length ratio to the human translation; it is still essentially literal, resulting in misinterpretation of the metaphor. Additionally, the *jilbab* is culturally specific, which may confuse TL readers. Accordingly, the human translation is more natural and conveys the intended meaning clearly, although it sacrifices the image that the metaphor holds.

Example 4

Source Metaphor فشعر بالقنوط يطفئ أضواء فرحه، ويخمد أنفاس أمله.

	Translation	Translation Strategy	Length Ratio
Human Translator	He felt despair smothering the last traces of his high spirits and suffocating all his hopes.	Dynamic Equivalence	1
ChatGPT-4	He felt despair extinguishing the lights of his joy and smothering the breaths of his hope.	Formal Equivalence	1
Matecat	He felt despondent, extinguishing the lights of his joy, and extinguishing the breaths of his hope.	Formal Equivalence	1

In the above example, the metaphor personifies despair "القنوط" as something capable of extinguishing and suffocating two important feelings. The human translator achieved a dynamic equivalence, producing a natural flow and poetic interpretation using s*mothering* and *suffocating* to convey oppression. It reflects the human skill to understand the underlying emotional meaning of the metaphor. On the other hand, both MT systems referred to formal equivalence in an attempt to maintain the original metaphorical meaning. ChatGPT-4 translation is less natural and fluent. Meanwhile, Matecat's translation lacks stylistic variety due to the repetitive use of *extinguishing*, and it fails to assign agency correctly by shifting the subject from despair itself to his own emotional state (despair → he). Even though all translations have the same length ratio, MT's use of formal equivalence resulted in a less impactful translation than the human's dynamically equivalent version.

6. Conclusion

This study aimed to investigate the translation strategies employed in rendering Arabic metaphors into English, specifically comparing the output of a human translator with that of two prominent MT systems, ChatGPT-4 and Matecat, through the lens of Nida's (1964) equivalence theory. The findings collectively underscore the persistent challenges that figurative language, particularly metaphor, poses for automated translation while simultaneously highlighting the indispensable value of human linguistic and cultural expertise.

Our analysis revealed a clear hierarchy in the practical application of dynamic equivalence strategies for Arabic metaphors. The human translator consistently demonstrated a strong command of dynamic equivalence, with a clear emphasis on producing a natural and idiomatic translation while maintaining the communicative impact of the original metaphor in the TL. This demonstrated the complex decision-making required for human literary translation and frequently involved complex re-creation, meaning compression, or identifying culturally relevant equivalents in the target language.

On the other hand, the MT systems produced mixed performance levels. With a noticeably greater percentage of dynamic equivalence, ChatGPT-4 proved to be a far more capable system than Matecat in managing metaphors. This implies that LLMs are becoming increasingly skilled at identifying and recontextualizing metaphorical language, going beyond mere literal translations, due to their vast training data and sophisticated creative capabilities. However, despite this progress, ChatGPT-4 still frequently resorted to formal equivalence or yielded less natural dynamic renditions, particularly when faced with highly culture-specific or deeply embedded metaphors. Matecat, which stands for a more traditional MT system, repeatedly leaned toward formal equivalence, frequently generating literal or unnatural translations that undermined the TT's naturalness and diminished the metaphor's intended meaning.

These findings carry significant implications for both the practice and pedagogy of translation. While MT systems, especially LLMs like ChatGPT-4, can offer valuable initial drafts and increase efficiency for certain text types, they are not yet capable of fully replicating the sophisticated interpretive and creative processes required for nuanced metaphorical translation. When working with texts rich in metaphorical expressions, where meaning, style, and cultural resonance are crucial, the study clearly reinforces the crucial role that the

human translator plays as both a post-editor and a creative contributor.

Future research could expand this inquiry by incorporating a larger corpus of metaphors from diverse Arabic literary genres, investigating the impact of specific metaphorical types (e.g., conceptual metaphors, novel metaphors, dead metaphors) on MT performance, and exploring the effectiveness of pre-editing strategies specifically designed to improve MT output for figurative language. Furthermore, qualitative studies focusing on the cognitive processes human translators employ when re-creating metaphors could provide deeper insights into the skills that current AI systems are still striving to emulate.

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BA and RK were responsible for study design, revising, and drafting the manuscript. All authors read and approved the final manuscript.

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