

## Lexico-Semantic Analysis of Khayyam's Quatrains: A Comparative Study of Machine Translation and Human Translation

MOHAMMAD AMIN EBRAHIMI FARD SH. (Corresponding author)

[0000-0001-8737-7254]

*School of Languages, Literacies and Translation  
Universiti Sains Malaysia  
Penang, Malaysia  
amin.ebrahimifard@gmail.com*

MANJET KAUR MEHAR SINGH

[0000-0002-7805-4215]

*School of Languages, Literacies and Translation  
Universiti Sains Malaysia  
Penang, Malaysia  
manjeet@usm.my*

### ABSTRACT

*This paper presents a comparative and descriptive analysis aimed at evaluating lexico-semantic translatability errors in Khayyam's Quatrains (1048-1131) when translated using the Persian online translation tool Targoman. Fitzgerald's (1859) human translation of the Rubaiyat serves as a reference point for assessing the quality of translation. The corpus for this study includes 30 quatrains from two translations (outputs from the Targoman Machine Translation & Edward Fitzgerald's translation, which is a human translation) of selected Persian classical poetry in the quatrain genre, authored by Omar Khayyam (1053-1123). These quatrains were chosen through a random sampling method from Khayyam's Rubaiyat. The study employs both comparative and descriptive analytical approaches to identify and evaluate the occurrence of lexico-semantic errors across different translation types. Using Liao's (2010) model, the most frequent errors in Targoman translations were Rendition Errors, especially issues with collocations, occurring 48 times. Errors followed this in translating phrasal verbs, which appeared 35 times. The least frequent errors, according to this model, involved the translation of proverbs (8 occurrences) and linguistic errors (1 occurrence). The purpose of this study is to assess the accuracy and effectiveness of Targoman's machine-generated translations of Omar Khayyam's quatrains by comparing them with Fitzgerald's human translations. The research aims to examine how well machine translation preserves the linguistic, semantic, and poetic nuances of the original text and to identify common errors that could affect the accuracy of meaning in translation. Additionally, the study concludes by emphasizing the need for further research into machine translation quality, highlighting its current limitations, and advocating for the use of more effective methods and strategies to address these issues.*

*Keywords: Human translation, Machine translation, Quatrains, Lexico-semantic errors, Targoman*

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## INTRODUCTION

Literary translation, particularly in poetry, remains one of the most complex and rewarding forms of translation. Zhang et al. (2025) highlight this limitation in their evaluation of LLM-generated poetry translations, noting that literal renderings tend to flatten metaphorical depth and stylistic intricacy. Similarly, Benthien and Gestring (2023) argue that poetry's form and content are inseparable, and that any disruption to this unity in translation risks distorting the poem's aesthetic and philosophical impact. Unlike conversational dialogue, poetry's structure is integral to its meaning, making its translation especially intricate. Persian poetry, particularly the works of Omar Khayyam, holds significant literary and philosophical value. Translating his poetry is essential for conveying its cultural and philosophical depth to a global audience. Despite increasing interest in machine translation and Khayyam's work, little research has systematically analyzed virtual translations of his poetry. While some studies (Bourdieu, 1993; King, 2021) examine aspects of translation, few comprehensively investigate linguistic errors in machine-generated translations of Khayyam's quatrains. This study aims to address this gap by analyzing English translations of Khayyam's quatrains, identifying common linguistic errors, and evaluating their effect on meaning. Unlike human translators, who ensure coherence and naturalness, Targoman struggles with ambiguity and context-dependent terms, highlighting the limitations of machine translation in achieving semantic precision.

Accordingly, this study seeks to answer two central research questions: In what ways does the Targoman translation machine differ from human translation in terms of lexico-semantic errors, as defined by Liao (2010) and which types of lexico-semantic errors—such as collocations, phrasal verbs, literary figures, idioms, and proverbs—occur most and least frequently in Targoman's translation of Khayyam's Quatrains (1120).

## AIMS AND OBJECTIVES

This study aims to evaluate the accuracy and effectiveness of Targoman's machine-generated translations of Omar Khayyam's quatrains by comparing them with Edward Fitzgerald's human translations. The study seeks to examine the extent to which machine translation preserves the linguistic, semantic, and poetic nuances of the original text and to identify common errors that may impact the integrity of meaning in translation.

## REVIEW OF THE LITERATURE

Nida's Equivalence Theory continues to underpin contemporary translation studies by emphasizing meaning preservation through culturally and linguistically adapted target-language expressions. Liao's (2010) taxonomy of translation errors, grounded in ATA and CTTIC frameworks, remains relevant, and its application has been extended in recent studies such as Eryigit et al. (2025). One recent example is Saridaki (2023), who emphasizes the pedagogical value of error taxonomies in translator training and the importance of systematic error classification in literary contexts. The field, initially focused on literary and poetic texts, recognizes the complexity of translating such works due to stylistic and cultural nuances. Human translation (HT) remains essential for literary texts, as demonstrated by Zhang et al. (2025), who

found that human translations consistently outperform LLM-generated outputs in terms of cultural fidelity and stylistic nuance. Recent research highlights persistent challenges in literary translation. Despite MT's progress, human expertise remains vital for literary translation, ensuring linguistic, cultural, and stylistic fidelity.

#### CLASSIFICATION OF ERROR TYPES (ADOPTED FROM LIAO, 2010)

Translation errors can be broadly categorized into three main types: Rendition Errors, Language Errors, and Miscellaneous Errors. These errors arise due to inaccuracies in conveying meaning, linguistic inconsistencies, or omissions in the translation process. The following sections provide a systematic classification of these errors based on the framework proposed by Liao (2010), with additional support from recent studies. For instance, Feng et al. (2025) introduced the TEaR framework, which systematically identifies and refines translation errors in LLM-generated outputs, highlighting persistent issues in semantic fidelity and grammatical coherence. Similarly, Guerreiro et al. (2024) developed the xcomet evaluation model, which categorizes translation errors through fine-grained span detection, offering a more transparent and diagnostic approach to machine translation assessment.

#### RENDITION ERRORS

Rendition errors occur when the translated text fails to accurately reflect the intended meaning of the source text. These errors manifest in various ways, as outlined below:

- R1: Misinterpretation of the source text  
Errors in this category result from selecting incorrect equivalents during translation, leading to misinterpretation of the original meaning (Fernandes et al. 2023).
- R2: Insufficient rendering  
This occurs when the translation is incomplete and does not fully convey the meaning of the original text, leading to a discrepancy between the source and target texts (Fernandes et al. 2023).
- R3: Excessive rendering  
In contrast to insufficient rendering, this type of error introduces additional details in the translation that were not present in the source text, thereby creating an unnecessary divergence (Fernandes et al. 2023).
- R4: Subtle differences in meaning due to insufficient accuracy  
Even minor discrepancies between the source and target texts can result in subtle changes in meaning, reducing the accuracy of the translation.
- R5: Misinterpretation due to unfamiliarity with terms  
This error arises when common or specialized terms in the source text are inaccurately translated, often due to a lack of understanding of their precise meanings. As a result, the translation may become unclear or misleading (Fernandes et al. 2023).

#### LANGUAGE ERRORS

Language errors in translation stem from linguistic inconsistencies that affect readability and coherence. These errors include grammatical mistakes, awkward phrasing, inappropriate register, and issues related to translation style.

- **L1: Grammatical mistakes or ungrammatical syntax**  
This occurs when grammatical rules or word order conventions of the target language are not followed (Fernandes et al. 2023).
- **L2: Awkward expressions, ambiguous meaning, and redundancy**  
This category includes expressions that are unclear, mismatched, or unnecessarily repetitive, reducing the readability and effectiveness of the translation (Fernandes et al. 2023).
- **L3: Inappropriate register**  
Some texts require a specific register (formal, informal, technical, etc.), and failing to match the appropriate tone and style results in a register error (Fernandes et al. 2023).
- **L4: Excessive literal translation leading to ambiguity**  
This error occurs when the translator adheres too rigidly to the structure of the source text, making the translation unnatural or difficult to understand in the target language (Fernandes et al. 2023).
- **L5: Excessive free translation**  
In contrast to literal translation errors, excessive free translation disregards the structure and meaning of the original text, creating inconsistencies and misalignment between the source and target texts (Fernandes et al. 2023).
- **L6: Incorrect characters, improper punctuation, or inconsistencies in translation**  
These errors pertain to orthographic mistakes, incorrect punctuation usage, or inconsistencies in translating specific terms within a text (Fernandes et al. 2023).

#### MISCELLANEOUS ERRORS

Miscellaneous errors occur when certain elements of the source text are omitted in the translation, leading to incomplete or missing information.

- **M1: Omission of content in the target text**  
This error arises when parts of the source text are unintentionally left untranslated, resulting in an incomplete rendering of the original message (Fernandes et al. 2023).

**Table 1**

*Classification of Error Types Adopted from Liao (2010)*

<b>Rendition Errors</b>
<b>R1:</b> Misinterpreting the source text.
<b>R2:</b> Insufficient rendering, which differentiates the translation from the original text.
<b>R3:</b> Excessive rendering, which differentiates the translation from the original text.
<b>R4:</b> Subtle difference of meaning between the source and target texts; insufficient accuracy.
<b>R5:</b> Misinterpretation due to unawareness of terms.
<b>Language Errors</b>
<b>L1:</b> Grammatical mistakes or ungrammatical syntax of the target language
<b>L2:</b> Awkward expression, including ambiguous meaning, mismatch, redundant words, and unnecessary repetition, etc.
<b>L3:</b> Inappropriate register
<b>L4:</b> Excessive literal translation, which leads to ambiguous translation.
<b>L5:</b> Excessive free translation, which differentiates the translation from the original text.
<b>L6:</b> Incorrect character, improper punctuation marks, or inconsistency in term translation.
<b>Miscellaneous Errors</b>
<b>M1:</b> Missing parts in the target text; (omission)

## METHODOLOGY

This study employs a comparative and descriptive analysis to evaluate the frequency of lexicosemantic translatability errors in the English translation of Khayyam's Quatrains (1859). The analysis compares the outputs of an online translation machine, Targoman, with Edward FitzGerald's human translation (1859), which serves as a benchmark for assessing translation accuracy.

## RESEARCH DESIGN AND PROCEDURE

The corpus consists of 30 randomly selected quatrains from Khayyam's *Rubaiyat*, based on Kazzazi's (1994) edition, which includes 158 Persian quatrains. The selected quatrains were translated into English by Edward FitzGerald (1859, fifth edition), serving as the benchmark for evaluating machine translation accuracy. To conduct the analysis, each Persian quatrain was inserted into Targoman, and the generated English translations were extracted. Using Liao's (2010) classification model, errors were categorized into distinct lexico-semantic types, and their frequencies were calculated for both machine and human translations. This comparative analysis allowed for an evaluation of translation efficiency and accuracy between the two approaches.

## DATA COLLECTION AND UNITS OF ANALYSIS

This study investigates the lexico-semantic accuracy of translations of Khayyam's *Rubaiyat*, focusing on human translation—specifically FitzGerald's (1859) first and fifth editions—and machine-generated outputs from Targoman. The research systematically examines translation errors through a comparative analysis of 30 randomly selected quatrains from Kazzazi's (1994) Persian edition, resulting in a dataset of 120 sentences.

The study's methodological framework integrates both qualitative and quantitative approaches to assess linguistic fidelity in translation. Lexico-semantic features, including collocations, phrasal verbs, idioms, proverbs, and literary figures, are analyzed using Liao's (2010) error classification model. FitzGerald's translations serve as a benchmark against which machine-generated outputs are evaluated. The analysis categorizes errors into rendition errors (misinterpretation, omission, addition), language errors (grammatical inaccuracies, awkward expressions, register inconsistencies), and miscellaneous errors (formatting inconsistencies, contextual misalignments).

To ensure validity and reliability, several methodological safeguards were implemented. The selection of quatrains was restricted to those attributed to Khayyam in Kazzazi's (1994) edition, ensuring authenticity. Additionally, only quatrains translated by FitzGerald in his first and fifth editions were considered, providing a consistent historical reference point. The dataset was further refined to include quatrains with significant lexico-semantic complexity, facilitating a robust comparative analysis.

A hybrid methodological approach was employed, combining expert-driven manual analysis with software-assisted corpus analysis and translation memory tools. This integration enabled both nuanced contextual interpretation and systematic pattern detection, enhancing the reliability of findings. Furthermore, the accuracy of linguistic elements was cross-verified using the *Dehkhoda Persian Encyclopedia* (1998), ensuring precise semantic evaluation.

By systematically classifying and analyzing translation errors, this study contributes to the broader discourse on machine translation quality assessment, particularly in literary contexts. The findings, presented through qualitative discussion and tabular data, offer insights into the limitations and strengths of machine translation systems when applied to complex literary texts.

## RESULTS

Fitzgerald's translation is a more accurate and meaningful rendition of the original Persian quatrain, with only a difference in emphasis between the source and target texts. The translation

successfully captures the poetic essence of the original while using natural-sounding English. For instance, the rendering of:

"میتروسم از ان که بانگ آید روزی / کای بیخبران راه نه آنست و نه این"

“A Muezzin from the Tower of Darkness cries / ‘Fools! Your reward is neither here nor There.’”

This demonstrates how Fitzgerald preserves both the philosophical tone and poetic cadence of the original. While this version slightly shifts the imagery (introducing “Tower of Darkness”), it nonetheless maintains the intended message of existential uncertainty. This fidelity to both meaning and aesthetic form illustrates the strength of Fitzgerald’s poetic translation and supports the initial claim. Although there is a slight shift in emphasis, this is a common challenge in translation, and Fitzgerald’s version effectively conveys both the meaning and tone of the original. As a result, Fitzgerald’s translation can be considered a strong example of poetic translation, maintaining the aesthetic quality of the source text while preserving its intended meaning in English.

In contrast, the Targoman translation contains significant errors in both rendition and language. The translation does not provide an accurate or meaningful representation of the original text and includes phrases that fail to align with the intended meaning. Furthermore, it suffers from grammatical mistakes and incoherent expressions, which further undermine its accuracy and readability. For instance, the rendering of:

“قومی متفکرند اندر ره دین”

as “She’s thinkers, so she goes on”

demonstrates both syntactic inaccuracy and semantic distortion. The original phrase, which conveys a contemplative engagement with religious inquiry, is misrepresented through ungrammatical structure (“she’s thinkers”) and an unrelated action (“so she goes on”), ultimately obscuring the philosophical depth of the source.

Based on Liao’s (2010) model, the most frequent errors in the Targoman translation likely fall under Rendition Errors, particularly R1 (Misinterpreting the source text) and L1 (Grammatical mistakes or ungrammatical syntax in the target language). These errors typically arise when a translator lacks proficiency in either the source or target language, or when cultural differences are not accounted for in the translation process. The least frequent errors in this case are likely M1 (Omissions in the target text) and L3 (Inappropriate register), as the primary issues stem from misinterpretation and structural errors rather than deliberate omissions or stylistic mismatches.

Additionally, based on the errors observed in the Targoman translation, it is plausible that the machine translator deviated from an overt translation strategy—one that prioritizes the preservation of the original text’s form, structure, and meaning. The presence of Rendition Error (R1) suggests that the machine misinterpreted the source text, revealing a lack of attentiveness to lexical specificity and contextual nuance. For instance, in the quatrain:

“دل می ورد ز دستم، صاحب دلان خدا را”



My heart is beating, I have stuck the owners of hearts, O God

Targoman renders “صاحب دلان” as “owners of hearts,”

which, although literal, distorts the intended meaning of “those who possess spiritual insight or emotional depth.” This misrepresentation exemplifies a semantic deviation that undermines the philosophical subtleties embedded in Khayyam's diction. Moreover, the occurrence of Language Errors (L1) and Miscellaneous Errors indicates a freer, less precise translational approach, possibly influenced by a prioritization of fluency over fidelity.

The findings of this study contribute to the existing body of research on literary translation, particularly in the domain of machine translation (MT) and its challenges in rendering poetry. Previous studies have widely acknowledged the limitations of MT in capturing the nuances of figurative language, cultural allusions, and the aesthetic qualities of poetic texts (Miremadi, 2003; Liu & Latiff, 2019). However, this study extends such discussions by providing a comparative analysis of Fitzgerald's human translation and Targoman machine-generated output, offering concrete evidence of specific error categories that hinder the accuracy and readability of MT-generated poetic translations.

Notably, the frequent occurrence of Rendition Errors (R1) and Language Errors (L1) in Targoman translation aligns with findings from Koehn and Knowles (2017), who argue that MT struggles with complex linguistic structures and non-literal meanings. However, this study advances the discussion by demonstrating how these errors manifest in the context of Persian-to-English poetry translation. The misinterpretation of source text meaning (R1) suggests that MT algorithms may lack the requisite semantic depth to process the layered meanings characteristic of Persian quatrains, which often employ metaphor, symbolism, and cultural references. This supports the argument by Toral and Way (2018) that while MT has improved in prose translation, its capacity for handling poetic texts remains significantly limited.

This reinforces findings by FA Otaif (2025), who suggests that poetic translation requires a high degree of creative intervention that current MT models are ill-equipped to perform. In contrast, Fitzgerald's translation, despite minor shifts in emphasis, effectively preserves both meaning and aesthetic quality, demonstrating the irreplaceable role of human intuition and literary sensitivity in poetic translation. Overall, this study underscores the persistent gap between human and machine translation in the literary domain, particularly in poetry, where meaning is inextricably linked to form and cultural context. Future research may build upon these findings by exploring whether advances in neural machine translation (NMT) models, particularly those incorporating deep learning and contextual embedding, can mitigate the rendition and grammatical errors observed in this study.

#### SAMPLE EXAMPLES

Quatrain one (Persian quatrain) (Collocation Category)

چون عهده نمیشود کسی فردا را  
حالی خوش دار این دل پر سودا را  
می نوبه ماهتاب ای ماه که ماه  
بسیار بتابد و نیابد ما را

Fitzgerald (Human Translation of the Persian quatrain)

You rising moon that looks for us again  
How oft hereafter will she wax and wane  
How oft hereafter rising look for us  
Through this same Garden, and for one in vain

Targoman (Translation of the Persian quatrain)

Because I will not be able to manage it  
Now, here she is, at last, the gay and romantic  
For the moon's sake  
Come in, come in, come in!

ERROR ANALYSIS OF TARGOAMN BASED ON LIAO'S CLASSIFICATION

Applying Liao's (2010) taxonomy of errors to the analysis of lexico-semantic issues in Persian translations reveals distinct types of errors across various examples. These errors include rendition errors, language errors, and miscellaneous errors, each affecting the accuracy and naturalness of the translated text.

Rendition errors, particularly in the context of collocation, are evident in several examples. For instance, the translation of "چون عهده نمیشود کسی فردا را" as "Because I will not be able to manage it" misinterprets the original Persian phrase, which actually means "Since no one can promise tomorrow." Similarly, the translation of "حالی خوش دار این دل پر سودا را" as "Now, here she is, at last, the gay and romantic" fails to convey the intended meaning, which is "Cheer up this sorrowful heart now." This error also reflects a collocation issue, as the phrase "gay and romantic" does not appropriately fit the context of the Persian phrase. The correct translation in this case should be "Cheer up this sorrowful heart now," accurately reflecting the sentiment of the original text.

Language errors regarding collocations further complicate the translation process. For example, "می نوش به ماهتاب ای ماه که ماه" is inaccurately translated as "For the moon's sake," whereas the correct translation is "Drink under the moonlight, O moon." This error results from a literal and inaccurate interpretation of the original Persian phrase. Another instance is "بسیار بتابد و نیابد ما را" which is translated as "Come in, come in, come in!" This translation is nonsensical and does not capture the meaning of the original Persian, which is "The moon will shine many times and not find us."

Lastly, miscellaneous errors often involve misinterpretation of the original context and meaning. The phrase "Because I will not be able to manage it" exemplifies this issue, as it inaccurately conveys the intended meaning of the original Persian text. The correct translation, "Since no one can promise tomorrow," preserves the original context and intent of the phrase.

### Quatrain two (Persian quatrain) (Idioms & Proverbs Category)

قومی متفکرند اندر ره دین  
قومی به گمان فتاده در راه یقین  
میتروسم از آن که بانگ آید روزی  
کای بیخبران راه نه آنست و نه این

#### Fitzgerald (Human Translation of the Persian quatrain)

Alike for those who prepare for *to-day* prepare,  
And those that after a *to-morrow* stare,  
A Muezzin from the Tower of Darkness cries  
"Fools! your Reward is neither Here nor There."

#### Targoman (Translation of the Persian quatrain)

She's thinkers, so she goes on.  
You know, people are so cynical.  
And I fear the sound of it now  
Mighty is no way, nor is it

#### TARGOMAN ANALYSIS BASED ON LIAO'S TAXONOMY OF ERRORS (2010)

This quatrain is best categorized under Idioms and Proverbs due to its reliance on culturally embedded expressions and philosophically nuanced phrases whose meanings transcend literal interpretation. The language is idiomatic in nature, reflecting abstract concepts such as faith, doubt, and spiritual confusion. These elements require interpretive translation strategies that account for figurative meaning rather than direct equivalence.

Rendition errors in translation involve misrepresenting the meaning or context of the original text, often due to issues with word choice or phrasing. For example, the translation "She's thinkers, so she goes on" for the Persian idiom "قومی متفکرند اندر ره دین" represents a significant rendition error. The original Persian phrase translates accurately to "Some people ponder on the path of religion," which captures the reflective nature of the original meaning. Similarly, the phrase "You know, people are so cynical" fails to convey the intended idiomatic meaning of "قومی به گمان فتاده در راه یقین," which should be translated as "Some people have fallen into doubt on the path of certainty." The mistranslation arises from a misinterpretation of the phrase's deeper meaning, affecting the overall message conveyed.

Language errors occur when the translation does not adhere to the linguistic norms or syntactic structures of the target language. An example is the idiom "Mighty is no way, nor is it," which is a literal and inaccurate translation of the Persian proverb "کای بیخبران راه نه آنست و نه این." The correct translation should be "O ignorant ones, the path is neither this nor that," which more faithfully represents the philosophical and mystical depth of the original Persian proverb. Another language error is found in "She's thinkers, so she goes on," where the term "goes on"

fails to match the intended meaning of contemplating or pondering in the context of the Persian phrase "قومی متفکرند اندر ره دین".

Miscellaneous errors encompass a range of issues that do not fit neatly into other categories but still impact the accuracy of the translation. For instance, the translation of the idiom "And I fear the sound of it now" misinterprets "میتسم از آن که بانگ آید روزی", which should be translated as "I fear that a cry will come one day." This error reflects a misunderstanding of the original phrase's meaning, leading to a translation that does not accurately convey the original sentiment.

#### Quatrain three (Persian quatrain) (Literary Figures & Phrasal Verbs Category)

در کارگه کوزه‌گری رفتم دوش  
دیدم دو هزار کوزه گویا و خموش  
ناگاه یکی کوزه برآورد خروش  
کو کوزه‌گر و کوزه‌خر و کوزه فروش

#### Fitzgerald (Human Translation of the Persian quatrain)

Shapes of all sorts and sizes, great and small  
That stood along the floor and by the wall  
And some loquacious vessels were, and some  
Listened perhaps but never talked at all

#### Targoman (Translation of the Persian quatrain)

I went to D ' Artagnan  
I saw two thousand anticipation jars  
and one of them uttered a cry of agony  
The Cougourde and the Cougourde and the Barrier

#### TARGOMAN'S TRANSLATION ANALYSIS ACCORDING TO LIAO'S TAXONOMY OF ERRORS

For the third quatrain, the most appropriate category is Literary Figures, due to its rich use of metaphor, symbolism, and allegory. The entire quatrain functions as a philosophical-allegorical metaphor. The jars symbolize human beings; their "speech" and "silence" reflect layers of historical memory and existential depth. The sudden outcry—“Where is the potter, the buyer of pots, and the seller of pots?”—raises profound ontological and theological questions about creation, purpose, and commerce of life. Phrases like “talking and silent jars” or “one jar roared” embody personification, symbolism, and sometimes paradox.

These are not literal descriptions but poetic devices that require recognition of figures of speech, such as metaphor, personification, and oxymoron, to be translated meaningfully. The setting of the pottery workshop acts as an extended metaphor, in which each component (jar, potter, buyer, seller) symbolically contributes to a deeper reflection on fate, identity metaphysical inquiry. So, unlike the first quatrain (categorized under collocations) and the second (under idioms and proverbs), this third example clearly belongs in the domain of Literary Figures, particularly due to the presence of sustained poetic and philosophical imagery.

In the analysis of translation errors, various types of inaccuracies can be identified, each impacting the quality and fidelity of the translated text. Rendition Errors (Collocation) occur when the chosen word combinations in the translation do not accurately reflect the intended meaning of the original text. For example, the phrase "anticipation jars" is an inappropriate translation of the Persian phrase "دیدم دو هزار کوزه گویا و خموش," which literally means "talking and silent jars." The correct collocation should convey the duality of the jars being both "talking and silent," rather than an abstract concept like anticipation.

Literary Figure Errors are another significant category, where the translation fails to capture the literary devices or figurative language present in the source text. The same translation of "anticipation jars" also constitutes a literary figure error because it does not preserve the metaphorical depth of "گویا و خموش." The original phrase uses a metaphor to describe the jars as both communicative and silent, a nuance that is lost in the inaccurate translation. The correct rendition should maintain this figurative language by translating it as "talking and silent jars."

Phrasal Verb Errors involve misinterpretation or incorrect translation of verb phrases, leading to a distortion of the original action or meaning. For instance, the translation "uttered a cry of agony" does not correctly capture the intensity and suddenness of the Persian phrase "ناگاه یکی کوزه برآورد خروش," which means "suddenly one jar roared." The phrase "uttered a cry" lacks the force and immediacy of the original, making "suddenly one jar roared" a more accurate translation. Similarly, translating "در کارگاه کوزهگری رفتم دوش" as "I went to D'Artagnan" is entirely incorrect and fails to convey the actual meaning of the original, which is "I went to the potter's workshop last night."

Language Errors regarding phrasal verbs refer to broader issues in the translation that arise from incorrect or inappropriate word choices. The term "anticipation jars" not only misrepresents the collocation but also constitutes a language error, as it fails to accurately translate "کوزه گویا و خموش," which should be rendered as "talking and silent jars." This error highlights a fundamental misunderstanding of the source text, leading to a translation that does not faithfully represent the original meaning.

Finally, Miscellaneous Errors include errors that do not fit into the other categories but result in a significant departure from the source text. An example of this is the nonsensical translation "The Cougourde and the Cougourde and the Barrier" for the Persian phrase "کو کوزهگر و کوزهخر و کوزه فروش," which means "Where is the potter, the buyer of pots, and the seller of pots?" This translation is entirely unrelated to the original text and fails to convey its meaning, highlighting a serious disconnect between the source and target languages.

**Table 2**

*Aggregate Error Counts for Targoman Translation*

Error Type	Machine Translation System	Rendition Errors	Language Errors	Miscellaneous Errors	Total number of each language unit in different error types
Collocation	Targoman	24	11	13	48
Idiom	Targoman	14	9	10	33
Literary Figure	Targoman	11	7	7	25
Phrasal Verb	Targoman	14	5	16	35
Proverb	Targoman	7	6	5	18
The Aggregate of Error Numbers	Targoman	Rendition Errors in Different Units 70	Language Errors in Different Units 38	Miscellaneous Errors in Different Units 51	

**Table 3**

*The percentage of Liao's error type in Targoamn*

Rendition Errors	Language Errors	Miscellaneous Errors
49%	29.4%	21.6%

## DISCUSSION

The study reveals that Targoman encountered significant challenges in translating Khayyam's quatrains, particularly when compared to FitzGerald's translation. The errors observed in Targoman's output were more frequent and severe, primarily in the areas of rendition, as classified by Liao's model, and language, which included grammatical and structural inaccuracies. While rendition-related errors constituted the largest category in terms of error distribution, linguistic deficiencies were identified as the primary underlying issue affecting the machine translation process.

The complexity of Iranian poetry, particularly Khayyam's quatrains, poses substantial challenges for machine translation systems, as they often fail to interpret intricate linguistic structures accurately. A key difficulty lies in the accurate rendering of lexico-semantic elements, including collocations, phrasal verbs, literary devices, idioms, and proverbs. These findings are consistent with previous research, such as Abdul Ghaffar's (2024) comparative analysis of neural machine translation and human translation of Al-Mutanabbi's poetry, which underscores the inability of current systems to capture poetic sensibility, cultural subtleties, and interpretive depth. This reinforces the argument that machine translation, while effective in conveying literal meaning, remains inadequate for preserving the aesthetic and philosophical richness of poetic texts.

Overall, the results confirm prior studies that emphasize the shortcomings of machine translation in preserving the original style, tone, and cultural context of literary texts. For instance, Gao et al. (2024) conducted a comparative analysis of ChatGPT, Google Translate, and DeepL in translating Chinese classical poetry, revealing that while large language models show promise, they still struggle with poetic rhythm, imagery, and semantic depth. Similarly, Karaban (2024) examined GPT-3.5's translations of Ivan Franko's poetry and found that although AI-generated translations can approximate human output in surface fluency, they often fall short in conveying cultural and emotional resonance. Given these limitations, Targoman appears to be unsuitable for translating literary works, especially poetry, as it struggles to capture the nuances and subtleties of the original text. Nevertheless, ongoing research and advancements in machine translation technology may contribute to improved accuracy and reliability in literary translation in the future.

#### CONTRIBUTION OF THE STUDY

This study significantly contributes to the field of translation studies, particularly in literary translation, by systematically analyzing errors in Targoman's machine translations of Khayyam's Persian quatrains. It identifies critical issues related to lexico-semantic features, including collocations, idioms, literary figures, and proverbs, offering valuable insights into the challenges of machine translation in capturing poetic and cultural nuances. While it does not introduce new theoretical frameworks, it enhances the understanding of machine translation limitations in literary contexts.

A key aspect of this research is the comparative analysis of Targoman and Google Translate, which highlights their distinct errors and translation methodologies. The findings reveal Targoman's deviation from an overt translation strategy, affecting the fidelity and interpretative accuracy of the translations. This underscores the significant impact of translation approaches on overall quality and reinforces the necessity of human intervention to address these deficiencies.

The study also emphasizes the indispensable role of human translators, whose linguistic and cultural expertise remains crucial in literary translation. By demonstrating machine translation's limitations, it advocates for a collaborative approach where human translators refine and enhance machine-generated outputs. These findings contribute to ongoing discussions on improving machine translation technologies while reaffirming the irreplaceable value of human expertise in literary translation.

#### IMPLICATION OF THE STUDY

The findings have important pedagogical and practical implications. In teaching, they highlight the necessity of human translation in literary contexts and the challenges posed by machine translation, particularly in handling lexico-semantic complexities. Educators can use these insights to emphasize translation strategies, foster critical thinking, and promote cultural and linguistic competency among students.

For professional translation, the study underscores the need for caution when using Targoman for literary texts, as its inability to capture poetic nuances necessitates human revision. The findings reaffirm that cultural and linguistic competence is essential for accurate literary translation. While machine translation can assist in preliminary translation tasks, human intervention remains crucial for ensuring quality. A balanced approach, integrating both

machine-assisted translation and human refinement, is necessary to enhance the accuracy and interpretative depth of literary texts.

## CONCLUSION

To address the limitations of the study more explicitly, it is essential to acknowledge the broader implications of Targoman's performance in translating Khayyam's quatrains. The findings highlight significant deficiencies in machine translation (MT) when applied to literary texts, particularly poetry, due to challenges in rendering complex linguistic structures, maintaining stylistic fidelity, and preserving cultural nuances. These limitations suggest that, in its current state, Targoman is not a reliable tool for translating literary works, as it struggles with both rendition accuracy and linguistic coherence.

Given these constraints, future research should focus on enhancing MT systems by incorporating more sophisticated natural language processing (NLP) techniques, such as neural networks trained specifically on poetic texts. Additionally, integrating contextual and semantic analysis models may improve the system's ability to interpret idiomatic expressions, literary devices, and cultural references. From a practical perspective, human intervention remains crucial in literary translation, and hybrid approaches—combining MT with human post-editing—could serve as a more viable solution. Further studies should also investigate the potential for adaptive machine learning models that refine their translations based on literary context, thereby improving accuracy over time.

By explicitly addressing these limitations and proposing targeted solutions, this study contributes to the ongoing discourse on the role of MT in literary translation, emphasizing the need for continued technological advancements and human oversight in preserving the integrity of poetic works.

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