

## **Error Analysis of a Machine-Translated Poem: Towards a Teaching Guide**

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### **Abstract**

The article is a suggested three-hour practical class on teaching error analysis in a machine-translated poem in the French to English direction. The poem *Femmes de France* by Léopold Sédar Senghor was used in the step-by-step error analysis teaching. The article shows how four machine translation (MT) systems (Amazon, DeepL, Google and Microsoft) output a typical poem by an African author and how the analysis of the errors from the four machine translations can be taught to students of the literary MT class. The poem was first analysed for errors against the original work, which is in French, and then analysed again for errors against Melvin Dixon's English translation (human translation). An adaptation of Koponen's (2010) error classification model for MT was chosen for this demonstration because the model was found more suitable for analysing meanings and intentions in the literary genre of poetry than the other available models. In the end, it is revealed that the error class of mistranslated concept, after analysis against the human translation (HT), had a more significant number of errors than the same class of mistranslated concept when analysed in the source poem. This result shows the students that the human translator is a more critical reference than the poem's author when evaluating the MT of poetry.

**Keywords:** Poem, Human Translation, Machine Translation, Teaching, Error classification, Translated Concepts

### **1.0 Introduction**

These days, there is no underestimating the fact that language teachers and students often fall for the use of translation tools like Amazon, Google, Deep L, Microsoft, etc. As the years go by, it should be understood that the recourse to Machine Translation (MT) should include making teaching languages and translation easier and enjoyable.

Scholars in the field of translation are making cases to support the machine translation of literature; for example, Masutov (2019) used his work to show that MT is suitable for literary translation.

This paper sets out to answer specific questions through the error analysis of a poem. Do machine translation systems output particular errors in the translation of poetry? If yes, what are those errors? How best can the machine translation of poetry be introduced and taught to students of literary MT? The author has chosen one poem by

Léopold Sédar Senghor: *Femmes de France* for this analysis. The poem is drawn based on the poetic alliteration in the title, from his famous collection *Oeuvre Poétique*, translated as *Collected Poetry* by Melvin Dixon.

The author tries to show a sample step-by-step process of introducing and teaching error analysis of a machine-translated poem to translation students. The second intention is to, through an adaptation of Koponen's error classification model, create and sustain the interest of translation students in analysing a poem. It is believed that if the sample analysis in this article cannot be accomplished in a class lecture of three hours, then the translation teacher is free to spill the sample into the following class lecture.

It is suggested that the MT teacher make a simple pre-plan similar to the classic lesson plan. This will guide him and help him stay focused as he teaches while

guiding and carrying the students along. At the end of the class lecture for the day, he can then glance again at his teaching plan to verify how much of his aim for the class has been accomplished. If possible, this aim should be made known to students from the onset of the class; this will help prepare them for the expectations of the class as an approach to active learning.

### 1.1 Literature Review

Gaspari (2001), in a survey carried out among 38 trainee translators who took three different courses on MT, assessed the degree of knowledge, opinions and impressions trainee translators have about MT. The survey showed that the more trainee translators were aware and involved in using machines for translation, the more prepared they were for professional translating.

Popescu (2013) identified error patterns produced by EFL (English as Foreign Language) students in Business and Public Administration at an intermediate English language proficiency level in her study. Thirty (30) students aged 20-24 in the survey translated journalistic texts of 15,000 words from Romania into English. In the end, she found that the highest number of errors was detected in the areas of morphological (251) and collocational (377) errors, as well as inaccurate renditions of lexical items (108). This indicated that students' collocational competence needed improvement.

Koponen (2015) showed the design of teaching MT post-editing courses. From the onset, assignments were given to familiarise the students with different types of MT systems, introduce the concept of pre-editing, introduce the students to a scenario where the post-editor has no access to the source text, introduce two different PE quality levels to the students and final assignment was to teach the students to the topic of MT quality and evaluation and to have them consider the distinction of fluency of language and adequacy of meaning in translation. In evaluating the student's learning outcome, it was seen that

they could assess the use of MT and PE critically; for example, the students did not consider pre-editing particularly beneficial, and it seemed relatively futile to spend time pre-editing if one still had to post-edit.

In one of Moorken's (2018) practical in-class translation evaluation exercises, 46 second-year translation undergraduate students at Dublin City University as part of a Computer-Aided Translation module with a two-hour time limit. They compared SMT and NMT using post-editing effort and adequacy and error typology. They copied 20 segments of a chosen Wikipedia page and grouped them equally into SMT and NMT. In the end, students were asked to submit a short report stating a preference for one MT system or the other for their language pair and explain their reasons, using examples from the exercise.

In their article, Soltani et al. (2020) reported on error analysis in the translation of five genres of literature: prose, drama, poetry, non-fiction and media from English to Persian. Using quantitative and descriptive research designs, 28 senior BA students were given three paragraphs from each prose, drama, and non-fiction genre and four stanzas from poetry to translate. The participants were presented with the extracts of the five genres in five weeks, and one and a half hours were allotted to translate each text. In the end, he found that the most frequent errors in the poetry texts translated were punctuation (19.22%), terminology (16.16%), and omission (16.16%), respectively.

Daems J. et al. (2017) identified the relationship between specific MT problems and post-editing effort, with two authors annotating all translations for quality. Machine translation quality was analysed from the perspectives of acceptability and adequacy. Each error type was given an error weight ranging from 0 to 4. The annotation took place in two steps, respecting both perspectives above in step one, the annotators were only given the target text and annotated the text for acceptability, and in step two, annotators

compared the translations with the source texts and annotated the texts for adequacy. The annotations of both annotators were then compared and discussed, and only the annotations that both annotators agreed on were maintained for the final analysis. Out of 63 sentences, 60 sentences contained at least one error. There were more acceptability issues (201 instances) than adequacy issues (86 instances). From the perspective of 'acceptability,' it was the grammar and syntax category, which turned out to be the most common error category for MT output, with word order issues, structural issues, and incorrect verb forms occurring more than ten times each. From the perspective of 'adequacy,' other meaning shifts and word sense issues occurred.

Vilar, D. et al. (2006) present a framework for classification of the errors of an MT system and carry out an error analysis of the system used by the RWTH (*Rheinisch-Westfälische Technische Hochschule*) Aachen, in the first TC-STAR (Technology and Corpora for Speech to Speech Translation) evaluation. The error classification model is based on Missing Words, Word Order, Incorrect Words, Unknown Words and Punctuation errors.

Styme & Ahrenberg (2012) report results from a comparative evaluation of two systems where agreement was initially low and discuss the different ways to improve it. They compared the effects of using more or less fine-grained taxonomies and the possibility of restricting analysis to short sentences only. They report results on the inter-annotator agreement before and after measures were taken, on error categories most likely to be confused, and on the possibility of establishing error profiles without a high inter-annotator agreement. Virtually all approaches to human evaluation of MT output suffer from the weakness of low inter-annotator reliability. They show that it is possible to get a reasonable inter-annotator agreement either when using a simple error taxonomy or a

more detailed taxonomy and a set of guidelines for the annotators. Using guidelines in Phase 2 improved the error analyses compared to Phase 1.

Chung-ling (n.d.), in her investigation, tries to justify the effectiveness of teaching the concept of text types through the cognitive method of MT error analysis. 20 students were asked to edit MT errors and then count the frequency of particular MT errors at the lexical, syntactical and, if necessary, pragmatic levels. Students eventually calculated the average number of MT errors for each text type. Then, they used the statistics to rank the syntactic complexity and the degree of lexical ambiguity or pragmatic clarity. After the students' responses to an administered questionnaire, it was observed that students generally found that the average number of lexical, pragmatic and syntactic errors in the MT output of the informative text type was lower than in the evocative/operative and expressive text types. They observed that the excerpts from the drama and fiction or passages extracted from the advertisement and speech contained many metaphorical expressions that required translators to use esthetic or artistic language to modify the literal translations produced by the MT system. In the meantime, they found that most of the lexical items in the expressive text type were used to describe facts and embody referential meanings so that the MT system could more satisfactorily process them.

From the works reviewed above, no work currently exists on teaching Error Analyses of MT of poetry using an adapted model of error classification of MT.

## 1.2 Methodology

The methodology used in the paper hinges on the Principle of nurturing active learning (University of Aberdeen, n.d.) and Koponen's (2010) model of Classification of error analysis of MT. Nurturing active learning involves practical activities that ensure clear communication with all

students, such as the teacher sharing the aim of the lesson with the students. First, the different MT systems are presented. The poem and its human and machine translations are also presented and line-numbered. (The teacher is encouraged to make copies of both the source poem and the human translation available to the students.) After the numbering, it is evident that the source poem has more lines than The HT. Koponen's model for the classification and analysis of MT errors is explained. After that, the adaptation and reasons for adapting the model are given. This is followed by a tabular and subsequent analysis of the errors in the four different MTs following the adaptation of Koponen's model. The error analysis is done first in reference to the source poem, which is in French and then again with reference to the HT. Post-edit (PE) points are only briefly mentioned and not discussed in detail or as part of the analysis.

### 1.3 Presentation of MT systems

The teacher could start by trying to identify how many MT systems exist. How many do the students already know? Google, Amazon, Yandex, Linguee, Trados, Reverso, etc. The teacher is encouraged to ascertain how many students have used any of the systems to translate documents or in other class assignments. This is a vital check as Gaspari (2001) noted in an experiment with thirty-eight trainee-translators that "the" difference in the right/wrong questions ratio between phase 1 and 2 for section A of the questionnaire showed that the students after the course had on the whole a high degree of knowledge about MT as a subject,

which was very different from the initial situation when most students answered by choosing the "do not know" option or ticking the wrong option. For students who answered in the affirmative about using MT, the teacher can verify their satisfaction with their experience with the tool. How satisfied were they with the outcomes? Following this stage, the teacher is encouraged to introduce and briefly describe the four MT systems used in the lesson.

### 1.4 Presentation of the Poem

As with the presentation of MT, the teacher is also expected to ascertain students' knowledge of poetry quickly. What do students already know about poetry? How many types of poetry can they mention? How many students are interested in poetry or have ever written poetry? Do students think MT tools can understand, translate or generate poetry? Do they think humans can and should use MT systems for poetry? Will MT disrupt the natural, spontaneous and creative instinct of poetry in humans? Which poets can they already mention? Following this, the teacher could then progress to give a brief overview of the poem *Femmes de France*, the author and the human translator. For example, *Femmes de France* is a poem in Léopold Sédar Senghor's 1948 collection *Hosties Noires*. It is a praise for Miss Jacqueline Cahour. Table 1 below shows the source poem (French) on the right and Melvin Dixon's translation on the left. Both versions have been line-numbered separately, following the lines produced by the translator and the author, as they appear in the *Collected Poetry* (Senghor, 1991, pp. 58 & 332).

Table 1: *Presentation of the HT and Original Version of Femmes de France*

<i>Women of France</i> To Miss Jacqueline Cahour	FEMMES DE FRANCE A MADEMOISELLE JACQUELINE CAHOUR
1 Women of France, and you, daughters of France,	1 Femmes de France, et vous filles de France
2 Let me praise you! Let the clear notes of the <i>sorong</i> sound	2 Laissez-moi vous chanter ! Que pour vous soient les notes
3 for you!	3 claires du sorong.
4 Accept them, though their rhythm may seem barbarous,	4 Acceptez-les bien que le rythme en soit barbare, les
5 The harmony discordant as the peasant's milk and coarse	accords
6 bread,	5 dissonants.
	6 Comme le lait et le pain bis du paysan, purs dans ses mains

7 So pure in his clumsy and calloused hands!  
 8 You handsome trees standing tall beneath cannon fire and  
 9 bombs, the only support during days of overwhelming  
 pressure,  
 10 Days of panic and despair.  
 11 You, proud towers, stately bells under the arrogant sun in  
 12 June.  
 13 You the clear echo of the Gaul's screeching rooster!  
 14 Your letters have cradled these prison nights with words,  
 15 As translucent and silky as wings,  
 16 Words as sweet as a women's breast, singing like an April  
 17 Stream.  
 18 Bourgeois women, peasant women, you were never greedy,  
 19 For them you dared to brave the Hyena's challenge!  
 20 An attack more mortal than bullets.  
 21 And their hard brows opened for you and for you alone  
 22 Their simple words were clear as their dark eyes and  
 23 Transparent water.  
 24 Only you heard the beating of the heart like the sound  
 25 Of a distant drum when you had to dismount the horse  
 26 And put your ear to the ground.

27 For them you were mothers, for them you were sisters.  
 28 Flames of France, Flowers of France, bless you!

7 si gauches et calleuses !  
 8 O vous, beaux arbres droits debout sous la canonnade et  
 9 les bombes  
 10 Seuls bras aux jours d'accablement, aux jours de  
 désespoir  
 11 panique  
 12 Vous fières tours et fiers clochers sous l'arrogance du  
 soleil  
 13 de juin  
 14 Vous clair écho au cri du coq Gaulois !  
 15 Vos lettres ont bercé leurs nuits de prisonnier de mot  
 16 diaphanes et soyeux comme des ailes  
 17 De mot doux comme un sein de femme, chantants comme  
 18 un ruisseau d'avril.  
 19 Petites bourgeoises et paysannes pour eux seuls vous ne  
 20 fûtes pas avares  
 21 Pour eux vous osâtes braver l'affront de l'hyène, l'affront  
 22 plus mortel que des balles.  
 23 Et leurs fronts durs pour vous seules s'ouvraient, et leurs  
 24 mots simples pour vous seules  
 25 Étaient clairs comme leurs yeux noirs et la transparence  
 26 de l'eau.  
 27 Seules vous entendiez ce battement de cœur semblable  
 28 à un tam-tam lointain  
 29 Et il faut coller son oreille à terre et descendre de son  
 cheval.  
 30 Pour eux vous fûtes mère, pour eux vous fûtes sœurs.  
 31 Flammes de France et fleurs de France, soyez bénies !

## 2.0 Error Taxonomy

The Teacher mentions some different error classifications for MT like lexical errors, structural errors, pragmatic and semantic errors and non-translated sentences (Omar & Gomaa, 2020), missing words, word order, incorrect words, unknown words and punctuation errors (Vilar et al., 2006), etc.

The teacher can then introduce Koponen's model of error classification of MT of literature and explain the reasons for the choice.

Koponen's Error Classification model is adapted for the lesson as it was found to be simple enough for students to commit to memory during the classification and analysis of errors in the MT of the chosen poem. Koponen's Error classification model is as follows:

**Omitted concept:** source text (ST) concept that is not conveyed by the target text (TT).

**Added concept:** TT concept that is not present in the ST.

**Untranslated concept:** ST words that appear in TT.

**Mistranslated concept:** A TT concept has the wrong meaning for the context.

**Substituted concept:** The TT concept is not a direct lexical equivalent for the ST concept but can be considered a valid replacement for the context.

**Explicitated concept:** TT concept explicitly states information left implicit in ST without adding information.

From the classification above, the acronym is OAUMSE, but for the sake of more simplicity in teaching, this error taxonomy is adapted into SAUMEO:

**Substituted concept,**

**Added concept,**

**Untranslated concept,**

**Mistranslated concept**

**Explicitated concept**

**Omitted concept**

During the error classification, students are encouraged to format their

tables in the order of SAUMEO. Students are advised to maintain this order in the analysis, too. This will make for easier future revision and editing of their work. This adaptation will also aid the translation teacher while reviewing students' work. In Tables 2 and 3 below, the machine

translation versions have been numbered in reference to the numbering of the HT.

After the error analysis, Post-Edit points will become obvious. The teacher is advised to discuss the PE points in one of the MT translations with the students and require them to locate the PE points in the other MTs.

Table 2: *Amazon and DeepL Translations of Femmes de France*

Amazon Translate <i>WIFE FROM FRANCE</i>	DeepL Translate <i>WOMAN FROM FRANCE</i>
1 Women of France, and you girls from France	Women of France, and you girls of France
2 Let me sing you! Let for you be the clear notes	Let me sing for you! May the clear notes
3 of the sorong.	of sorong be for you.
4 Accept them although the rhythm is barbaric,	Accept them even though the rhythm is barbaric, the chords
5 the chords dissonant.	dissonant.
6 Like the peasant's milk and soft bread, pure in	Like the milk and his bread of the peasant, pure in his hands so left
7 his hands so left and callous!	and calloused!
8 O you, beautiful upright trees standing under	O you, beautiful straight trees standing under the cannonade and the
9 the cannonade and bombs	bombs
10 Only arms in days of overwhelming, days of panic despair	Only arms in days of despair, in days of panic despair
11 You proud tricks and proud bell towers under the arrogance of	You proud towers and proud steeples under the arrogance of
12 the June sun	the June sun.
13 You clearly echo the cry of the Gaulish Rooster!	You clear echo to the cry of the Gallic cock!
14 Your letters rocked their word prisoner nights	Your letters cradled their nights of prisoner of words
15 diaphanous and silky like wings	diaphanous and silky as wings
16 From word sweet as a woman's breast, singing like an April	Soft as a woman's breast, singing like an
17 stream.	April stream.
18 Little bourgeois and peasant women for them alone you were	Little bourgeois and peasant women, for them alone you were not
not stingy	stingy.
19 For them you dare to brave the affront of hyena,	For them you dared to brave the affront of the hyena, an affront
20 the affront more deadly than bullets.	deadlier than bullets.
21 And their hard fronts for you alone were opening up, and their	And their hard fronts for you alone opened, and their simple words
22 simple words to you alone	for you alone
23 Was clear as their black eyes and the transparency of the water.	Were as clear as their black eyes and the transparency of the water.
24 Only you heard this heartbeat similar to a	Only you could hear that heartbeat like a
25 distant tam-tam	distant tom-tom.
26 And you have to stick his ear to the ground and get off his horse.	And you have to stick your ear to the ground and get off your horse.
27 For them you were mother, for them you were sisters.	For them you were mother, for them you were sisters.
28 Flames of France and flowers of France, be blessed	Flames of France and flowers of France, be blessed!

Table 3: *Google and Microsoft Translations of Femmes de France*

Google Translate <i>FEMME DE FRANCE</i>	Microsoft Bing <i>WOMAN OF FRANCE</i>
1 Women of France, and you girls of France	Women of France, and you girls of France
2 Let me sing for you! May the clear notes of	Let me sing to you! Let the clear notes of the
3 sorong be for you.	sorong be to you.
4 Accept them although the rhythm is barbaric,	Accept them even though the rhythm is barbaric,
5 the chords dissonant.	the chords dissonant.
6 Like the milk and brown bread of the peasant, pure in his	Like the milk and bread of the peasant, pure in his hands
7 clumsy and callused hands!	so left and callous!
8 O you, beautiful upright trees standing under	O you, beautiful trees straight standing under
9 the cannonade and the bombs	the cannonade and bombs
10 Only arms in the days of despair, in the days of despair panic	Only arms to the days of overwhelm, to the days of panic despair
11 You proud towers and proud steeples under the arrogance of	You proud towers and proud bell towers under the arrogance
12 the June sun	of the June sun
13 You clearly echo the cry of the Gallic rooster!	You clear echo the cry of the Gallic rooster!
14 Your letters have rocked their prison nights with words,	Your letters have rocked their
15 diaphanous and silky like wings	diaphanous and silky word prisoner nights like wings
16 Of words as sweet as a woman's breast, singing like an	Word sweet as a woman's breast, singing like an
17 April stream.	April stream.
18 Petty bourgeois and peasant women for them alone you were not	Small bourgeois and peasant women for themselves you were not
stingy.	stingy
19 For them you dared to brave the affront of the hyena,	For them you dare to brave the affront of the hyena,

20	the affront more deadly than bullets.	the affront more deadly than bullets.
21	And their foreheads hard on you alone were opened,	And their hard foreheads for you alone opened,
22	and their simple words on you alone	and their simple words for you alone
23	Were clear like their black eyes and the transparency of water.	Were as clear as their black eyes and the transparency of the
24	Only you could hear this heartbeat similar	water.
25	to a distant tom-tom	Only you could hear that heartbeat similar
26	And you have to put your ear to the ground and get off your horse.	to a distant tam-tam
27	For them you were mother, for them you were sisters.	And you have to stick your ear to the ground and get off your horse.
28	Flames of France and flowers of France, be blessed!	For them you were mother, for them you were sisters.
		Flames of France and flowers of France, be blessed!

## 2.1 Error analysis of Machine translation of *Femmes de France* with Recourse to the Original Version Following the Adaptation of Koponen's Error Classification

Table 4: Overview of Errors in *Femmes de France* With Reference to the Original Version after the Adaptation of Koponen's Error Classification

The four machine translations were analysed against the source poem using Koponen's adapted model SAUMEO, and 15 errors spread across two concepts were found.

	Substituted concept	Added concept	Untranslated concept	Mistranslated concept	Explicated concept	Omitted concept
Amazon			3	3		
DeepL			3	1		
Google			1	1		
Microsoft			2	1		

**2.1.1 Amazon.** Amazon Translated the poem, revealing three untranslated concepts and three mistranslated concepts. Four PE (post-edit) points non-linked to the author's concepts were necessary.

**Untranslated concept.** "dissonant" in line 5 is left untranslated; it could have been "discordant".

"fronts" in line 21 is left untranslated; it could have been "forehead" or "brow".

The "tam-tam" in line 25 is also left untranslated; it should be "tom-tom" or "drum."

**Mistranslated concept.** "pain bis" (French version, line 6) was translated as "soft bread"; it should rightly be "brown bread" or "coarse bread".

"tricks" (line 11) is a mistranslation of "tours" (original version, line 12).

"Your letters rocked their word prisoner nights" (line 14) is a mistranslated concept of the phrase « vos lettres ont bercé leurs nuits de prisonnier » (original version, 15).

An example of a post-edit point is "let me sing you!" (line 2). There should have been the conjunction *for* before *you*.

**2.1.2 DeepL.** DeepL rendered the translation of this poem with three untranslated concepts, one mistranslated concept and three PEs not linked to the untranslated and mistranslated concepts.

**Untranslated concept.** "dissonant" (line 5) is left untranslated; it could have been *discordant*.

"bis" (line 6) was left untranslated too.

"fronts" (line 21) is left untranslated; it could have been *fore-head*.

**Mistranslated concept.** "your letters cradled their nights of prisoner of words diaphanous..." (line 14) is the first mistranslated concept.

**2.1.3 Google.** Google translated the poem, outputting one untranslated concept, one (1)

mistranslated concept, and two post-edits unlinked to the concepts.

**Untranslated concept.** “dissonant” (line 5) is left untranslated; it could have been “discordant”.

**Mistranslated concept.** “petty” (line 18) is not the same concept as “petites” (original version, line 19)

**2.1.4 Microsoft Bing.** Microsoft Bing translated the poem, outputting two untranslated concepts and one mistranslated concept. Nine PEs were necessary after translation.

**Untranslated concept.** “dissonants” (line 5) is left untranslated; it could have been *discordant*.

“tam-tam” (line 25) is left untranslated, too; this should be *tom-tom* or *drum*

**Mistranslated concept.** The concept of “...diaphanous and silky word prisoner nights” (line 15) does not fit into the concept of “...mot diaphane et soyeux comme...” (original version, line 16)

## 2.2 Error analysis in comparison with the HT Following the Adaptation of Koponen’s Error Classification

The four machine translations were analysed against Melvin Dixon’s translation using Koponen’s adapted model SAUMEO, and 16 errors spread across three concepts were found.

Table 5: Overview of Errors in *Femmes de France* With Reference to the HT after the Adaptation of Koponen’s Error Classification

	Substituted concept	Added concept	Untranslated concept	Mistranslated concept	Explicated concept	Omitted concept
Amazon		1		4		
DeepL		1		4		
Google		1		1		
Microsoft	1	1		2		

**2.2.1 Amazon.** Compared with the HT by Melvin Dixon, four mistranslated concepts and one added concept were discovered in the Amazon translation.

**Added concept.** “little” (line 18) is an added concept as this adjective is not used or insinuated in the reference translation.

**Mistranslated concept.** “only arms” (line 10) could have been translated as *the only support*.

The concept of “soft bread” (line 6) is different from the concept of “coarse bread” or “brown bread”.

“your letters rocked their word prisoner nights...” (line 14) is not coherent with “your letters have cradled these prison nights with words”.

“you proud tricks” (line 11) is not the same concept as “you, proud towers”.

**2.2.2 DeepL.** Four mistranslated concepts and one (1) added concept were discovered in the DeepL translation compared to the HT.

**Added concept.** “little” (line 18) is an added concept as this adjective is not used or insinuated in the reference translation.

**Mistranslated concept.** “bis bread” (line 6) is not the same concept as “coarse bread” or “brown bread”.

“only arms” (line 10) is a mistranslated concept compared with “the only support”; this is also due to the absence of the determinant “the” before “only arms.”

“your letters cradled their nights of prisoner of words...” (line 14) is a mistranslated concept of the reference translation “your letters have cradled these prison nights with....”



“their hard fronts” (line 21) is a mistranslation of “their hard brows”.

**2.2.3 Google.** Compared with the HT, one mistranslated concept and one added concept were discovered in Google Translation.

**Added concept.** “petty” (line 18) is an added concept as this adjective is not used or insinuated in the reference translation.

**Mistranslated concept.** “only arms” (line 10) is a mistranslated concept in comparison with “the only support”; this is also due to the absence of the determinant “the” before “only arms”.

**2.2.4 Microsoft.** Compared to the HT, one (1) substituted concept, one added concept, and two mistranslated concepts were discovered in the Microsoft translation.

**Substituted concept.** “tam-tam” (line 25) is a substituted concept for “drum” in the reference translation.

**Added concept.** “small” (line 18) is an added adjective to the concept of “bourgeois and peasant women” (HT, line 18).

**Mistranslated concept.** “only arms” (line 10) is a mistranslated concept in comparison with “the only support” (HT, line 9); this is also due to the absence of the determinant “the” before “only arms”.

The concept of “bell towers” (line 11) is not the same as the concept of “stately bells” (HT, line 11).

### 3. Conclusion and Future work

The purpose of adapting Koponen’s model of error classification and analysis in the output by the four MT systems is that it is easier for both the translation teacher and students to commit to memory and thus work faster during the error analysis. At the end of the two analyses, the students would have noticed that MT errors in the poem revolved around Substituted, Untranslated, Added, and Mistranslated concepts. In the first analysis, the errors revolved around only two concepts (Untranslated and Mistranslated concepts), while it revolved

around three (Substituted, Added and Mistranslated concepts) in the analysis against the HT. More errors are noticed in the MT of the poem when compared with the HT than the source poem, the class with the most errors being the class of Mistranslated concept. A simple explanation for this is that MT cannot yet beat humans in translating certain poetical conceptions. Before the four MTs were subjected to a reference (human) translation, the total number of Mistranslated concepts was six, but this number increased to eleven (11) in the light of comparison with the HT.

Understanding and translating meaning in poetry with MT tools could challenge MT systems. The outcome of this investigation is a green light for the translation teacher to encourage translation students to trust their innate judgement in translating words and phrases over MT. Translation students should be made aware that despite the current discussions about Machine translation systems taking over the jobs of professional translators, this will not happen for a long while to come as the MT system, by virtue of being built by humans, will also need human intervention to produce fine-tuned results. In their work, Kenny and Way (2001) submit that students should be made aware that all MT systems can be expected to show an overall improvement in quality.

Genzel. D et al. (2010) have postulated that machine translation of poetry is probably one of the hardest possible tasks in Computational Linguistics; hence, it becomes pertinent to simplify the introduction and teaching to translation students from the start, as this will lay a foundation for confidence in the case that some of them might want to branch off into Computational Linguistics, Neural Language Processing, etc., in their future careers.

Humblé (2020) proposes that one strong point for translation students to note at an early stage of their poetry translation education is that polysemy is a troublesome

problem for a machine since it will immediately choose the most common alternative. Translation students are encouraged to explore the creative use of MT tools, even in poetry generation. Ilonka (2018) believes it is hard to unravel why a machine learning algorithm does what it does, but it generally does pretty well.

A suggested practical for another class of analysis of MT poetry is to use an extract from a poem without a known human reference translation like *Ils sont venus ce soir* by Léon Gontran Damas. Analysing a poem without a known reference translation may enable the students to work freely, easily and faster. This is because the output or the analysis and revision of a translated work in any language is a direct offshoot of the comprehension and daily expressions of the students.

Suggested future research on comparing MT errors of poems on women and men is encouraged as this could reveal other notions about how MT output errors concerning gender. The translation teacher and the students could find the results interesting, even leading to more region-based investigations like error analyses of MT on poetry about African, Asian women, or American women.

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