

Machine translation as a potential tool for comprehension in multilingual classes

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Abstract

With an increase in international student enrollment and participation in student mobility programs year over year, the goal of this project was to determine whether Microsoft Translate could be used as a simultaneous translation tool in the classroom to help foreign students understand course material, especially in situations where the instructor is not lecturing in a language the students are fluent in. This was tested in two master's level courses at a Catalan institution with mostly international students. The results suggest that the language of instruction, which was either English or Catalan, determined whether the participants perceived to comprehend the translation. Furthermore, speech style was essential, with scripted speech appearing to outperform unscripted speech. The goal of this study was to detect whether this program might be utilized to make university lectures more accessible to all students. The findings suggest that when the teacher uses scripted speech in the classroom, students of various language backgrounds seem to understand the key ideas of the lectures.

Keywords: *speech-to-text translation, machine translation, Microsoft Translate, automatic speech recognition.*

1. Introduction

Human translators are trained to interpret complicated texts and consider aspects such as tone and culture or other nuances of a language; however, Machine Translation (MT) can often be free or inexpensive. Due to the fiscal cost of human translators, businesses have identified "a critical need to develop simultaneous MT techniques to reduce the burden of human interpreters and to make simultaneous interpreting services more accessible and affordable" (Wang et al., 2021). Machines are adept at analyzing massive volumes of data and may quickly deliver translations for simple, easy texts for a fraction of the cost.

The basic goal of MT is to break down linguistic barriers (Vieira et al., 2021), and this can be done with the help of two classes of translation. When the user must enter the text before the translation shows, this is known as *consecutive translation*. In contrast, *simultaneous translation* happens as the speaker is speaking (Cho & Esipova, 2017). Simultaneous MT has the advantage of allowing speakers from various language origins to engage in the same meetings or lectures, notwithstanding their differences in linguistic backgrounds. However, there are several difficulties to solve while using MT (Zakir & Nagoor, 2017). It might be challenging to

interpret human speech during simultaneous translations due to numerous pauses and interruptions. The translation tool would need to remove redundancies and repetitions before adding the punctuation in order for the sentences to be read and fully understood. The instrument must be congruent with the manner of speech, whether official and professional or informal and casual, in addition to arranging the sentence structure. One of the major barriers to MT is the large number of human languages. Many translation algorithms are incapable of detecting languages spoken in distant areas by few native speakers.

1.1. Using simultaneous machine translation in university lectures

There are various reasons why MT should be considered as simultaneous translation technology in university courses. For students who do not speak the language of instruction, MT can be utilized to give real-time translation of lectures. This is especially effective in classes with a high proportion of international students (Yang et al., 2021; Muller et al., 2016; Cho et al., 2013; Wolfel et al., 2008).

Additionally, MT may be utilized to aid with language learning. To assist students who are still learning the language of instruction, instructors may provide the students with translated versions of their lectures. This can aid in their comprehension of the material as well as their language abilities (Paterson, 2022).

Finally, MT enables accessibility for all pupils. MT can also be used to make lectures more accessible to deaf or hard-of-hearing students. These students can better follow along with the lecture if real-time subtitles or translations are provided (Kawas et al., 2016).

1.2. Introduction to the Problem

Catalan, a language spoken by around eight million people, is the official language of Catalonia's universities. Catalonia's university system, which consists of 12 universities, has an exceptional capacity to recruit international students. This is evident as there are now 34,755 international students among the 289,369 students registered in Catalan institutions. These students represent 176 different countries. Additionally, Catalonia has 150 undergraduate and master's degree programs that are exclusively taught in English (Recerca Universitat, 2022).

It sometimes occurs that these students from abroad enroll in subjects that are not taught in English, either because they need additional credits or because they are enrolled in Spanish or Catalan courses and assume they can attend a subject in those languages. Moreover, certain university programs provide lessons in all three languages (English, Catalan, and Spanish), which may not be accessible to all students if there are linguistic barriers. The students may even lack a good level of English or one of the other languages, making it difficult for them to grasp the lecture's topic.

The key difficulty is determining how to make the classes available to all enrolled students. In 2022, the Servei de Recursos Educatius of the Catalan universities was asked by the Catalan Government (via the CSUC-Consortium of Catalan Universities) to test MS Translate in classes containing a high number of international students. The objective was to see whether this simultaneous translation tool could solve this linguistic problem.

As a result, the main research question is as follows: Can Microsoft Translate be used in multinational classrooms to break down linguistic barriers? More specifically, does the style of speech, either unscripted or scripted, influence whether students feel they understand the lecture? Additionally, does the language of instruction appear to function better with the software, either English or Catalan?

2. Method

2.1. Participants

The participants were students in two master's courses at a university in the Catalan region of Spain. There were 29 participants in total, with 14 enrolled in a degree in international markets and 15 in the degree of teaching English as a foreign language. The students reported their native languages to be English, Catalan, Arabic,

Riffian, Ukrainian, Filipino, Russian, Polish, Spanish, Portuguese, Chinese, Romanian, Italian, German, Persian, Slovak, and Bahasa. Additionally, all of the students have a B2 level of English or higher. Only four of the students were proficient in Catalan.

2.2. Materials

The participants were instructed to use their own devices. They were told to log into Microsoft Translate with the class code and select their native language. The instructors wore lapel microphones that were also connected to the program. A technical advisor was available in the class to help the students log in and to make sure the application was functioning properly.

2.3. Procedure

The instructor, who was a native speaker of English, lectured in English, while the other instructor, who was a native speaker of Catalan, lectured in Catalan. The English-speaking instructor lectured first and read a news story in English. The same story was read by the Catalan instructor immediately following. Then, each of the instructors discussed the topic of mobile-assisted language learning in an unscripted fashion. The students responded to a Likert questionnaire scoring the speech based on whether they perceived the translation was easy to follow, whether the tool was easy to use, and whether they would recommend using this tool in a university classroom. The Likert scale was a seven point scale where one was considered to be strong disagreement with the statement and seven to be strong agreement with the statement. The data from the Likert scale was converted to a csv file and analyzed using JASP statistical software.

3. Results

Since there were two classes from different departments participating in this study, an ANOVA was conducted to see whether the two classes were responding in a similar fashion. There was no significant difference between the two classes of students $F(1) = 0.827, p = 0.371$; therefore, both classes were analysed together.

As all of the participants went through the same lectures in the procedure, a repeated measures ANOVA was used to compare the results for the different languages (English and Catalan) and the different styles of speech (scripted and unscripted). The results show that the language of instruction was significant with a medium to high effect $F(1) = 23.417, p < .001, \eta^2 = 0.074$, where the students scored the translations of English to be higher than the translations of Catalan. Additionally, there was a significant difference between the styles of speech with a low to medium effect $F(1) = 10.487, p = 0.003, \eta^2 = 0.029$.

As previously stated, the language altered the students' overall views when using Microsoft Translate. We can observe the means for each of the students' perceptions, the style of lecture, and the language when we look at the descriptive statistics. A score of one would be the lowest, a score of seven would be the highest, and a score of four would be neutral. For English, all mean ratings were greater than four, indicating that students typically believed the translation was accurate to their native languages, that they understood the translation, that the tool was simple to use, and that they would suggest it for university courses. With the exception of the unscripted Catalan lecture, the majority of the scores for the Catalan lectures were above neutral and in agreement. Most of the students were uncertain whether the unscripted Catalan translation was accurate (see Table 1 below).

Table 1. Descriptive Statistics.

Language	Style	Perception	Mean	SD
Catalan	Free Speech	Correct	3.931	1.486
		Easy	5.724	1.360

		Recommended	4.966	1.955
		Understood	4.690	1.538
	Scripted	Correct	4.828	1.560
		Easy	5.724	1.645
		Recommended	5.276	1.888
		Understood	5.172	1.649
English	Free Speech	Correct	4.793	1.590
		Easy	6.000	1.309
		Recommended	5.414	1.803
		Understood	5.690	1.390
	Scripted	Correct	5.517	1.153
		Easy	6.034	1.322
		Recommended	5.655	1.838
		Understood	6.034	1.149

4. Discussion

Machine learning and artificial intelligence advancements have considerably increased the quality and speed of speech-to-text translation, transforming it into a powerful tool for communication, automation, and accessibility. Since there is an increase in international enrollment year after year in Catalan universities, this study was designed to assess if students thought a speech-to-text translation technology, particularly Microsoft Translate, was useful for comprehending lectures given in a foreign language.

The first research question investigated whether the manner of speech, scripted or unscripted, influenced the students' perceptions of translation accuracy. The results demonstrate that the style of speech made a difference for both languages, $F(1) = 10.487$, $p = 0.003$, with scripted speech being significantly easier to follow than unstructured speech and scripted speech in English being easier to follow than scripted speech in Catalan.

To answer the second research question, whether English appears to perform better in a synchronous translation with Microsoft Translate than Catalan, which has a much smaller number of native speakers, the results show that the language used in the application made a difference, with English translations being considered more accurate, $F(1) = 23.417$, $p < .001$.

4.1. Limitations of the Study

The main limitation of the study is that only a fraction of global languages were included. Additionally, the assessment was based on the user experience and their perceptions of whether they believed this tool would work for comprehension of a university lecture, and such perceptions may hold biases. The assessment did not consider the actual accuracy of the translations and there were no controls to determine whether the students comprehended the lecture with and without MS Translate. Future research should include more variables; such

as attention disruption (reading in one language while listening to a different one), the influence of the proficiency level of the language that is being translated, and an assessment of the accuracy of each translation from the first languages. Further, a larger sample could be included in future studies where there are more controls.

5. Conclusions

The findings indicate that the application appears to be appropriate for use in university courses. The spontaneous translations of certain sentences caused some difficulty among the students, but they typically comprehended the lectures. The results and feedback from this study indicate that MS Translate as a simultaneous translation tool performs well in a classroom setting for both scripted and unscripted English translations. MS Translate has been demonstrated to perform well for scripted speech in Catalan, and it appears to work for unstructured speech as well; however, accuracy cannot be determined from this study. While the quality of MT tools and machine learning has considerable room for improvement, particularly in terms of accuracy, speed, and context awareness, speech-to-text machine translations will continue to become more accurate and coherent as machine learning develops.

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