Increasing United States College Access for Native Arabic Speakers:
Applying a Simplification Intervention and Evaluating Machine and Human Translations

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Abstract

Across many language backgrounds, a consistent hurdle to accessing United States higher education is understanding the basic information necessary to apply for admission and financial aid and complete the many enrollment management processes necessary to begin one's college career (apply for housing, receive and submit vaccinations, register for classes, etc.). However, to date, no studies have explored how this type of higher education information can be simplified and translated into Arabic, one of the most widely spoken languages in the world and a linguistic background shared by tens of thousands of prospective international students (and their families) seeking higher education in the United States. This case study reports on research-to-practice work conducted with the University of Iowa, specifically how the university simplified their enrollment management information and how that information was translated into Arabic for native Arabic speakers seeking access to the University of Iowa. Findings reveal that the institution simplified text to speak more directly to prospective student audiences by using second person pronouns and simpler sentence structure and diction to engage this audience. Moreover, analyses of machine and human translations of English to Arabic suggest that human translation should be the preferred mechanism of translating higher education information, as Google Translate and ChatGPT provided adequate but not perfect translations of Iowa's information. Implications for practice and college access are addressed.

Keywords: college access, language, linguistics, Arabic, English, translation, human-computer interaction, machine translation, Google Translate, ChatGPT, artificial intelligence

Dedication

The last time I saw Pat in person was during my dissertation defense at the cop shop on campus. The second-to-last time I saw Pat in person was at the IHOP off of I-35 in South Austin, just a few blocks from Southpark Meadows. That IHOP was our breakfast spot where I would meet her at her car, carry her backpack into the restaurant, and we'd chat about whatever papers we were working on. In all of my breakfasts with her, she never opened her backpack—it was almost a bodily appendage for Pat. She couldn't help but bring that backpack along for the ride. But beyond any academic talk we would have, I most enjoyed Pat's humor. Pat was funny.

Every time, without fail, during breakfast at IHOP, she would remind me of what a disaster the "IHOB" campaign was for the IHOP chain of restaurants. For those of you who don't remember, around 2018, IHOP created this marketing gimmick, calling itself "IHOB" to call attention to the warm, delicious fact that IHOP indeed sold burgers, as well as pancakes. Pat never got the pancakes—she'd have toast, and I'd get the heart-attack pancake or whatever pancake was the featured, most sugary pancake currently available. Anyway, for whatever reason, Pat could not let "IHOB" go.

She'd start our conversation with something like, "So, how's it going?"

I'd say, "Awesome, how you been?"

And she'd say something like, "Well, I received an email last night at 3:30am. Basically, I'm working with this rather feisty group of activists who want to essentially radicalize their government and regain control of academic freedom for their university professors."

I'd say, "Wow."

And then she'd say something like, "But out of curiosity, do you remember IHOB? What a joke that was! No one comes here for burgers. They come here for pancakes. Look at all the children here. They're not eating the burgers."

I'd say, between laughing, "Yeah, totally. International House of Burgers sounds weird, right?"

And then she'd say something like, "How could a large, national company greenlight an idea that stupid? Clearly, I don't think it has worked. IHOB was a bust."

To me, this was hilarious. It was Seinfeldian. It was an everyday observation with its humor compounded by its banality and simplicity.

And maybe she didn't mention IHOB every time we went to IHOP, but I can recall at least three separate instances when Pat got her licks in. IHOB was a bust.

After Pat's funeral, I was driving back to Mississippi and passed maybe ten IHOPs. That made the drive easier. We miss you, Pat.

Introduction

With the ever-growing rate of globalization in the world comes the ever-growing need for effective means of communication across languages and cultures. Now more than ever, there is a need for research in interlingual translation in all aspects of our global society. An often-overlooked component is the need for translation services for international students attending higher education in the United States (U.S.).

As of 2022, there were nearly 950,000 international students studying at U.S. universities. Of these students, 53,104 were reported as being from the Arabic-speaking countries that make up the Middle East and North Africa (NCES, 2022). The native Arabic-speaking community is a rapidly expanding demographic in the U.S. in need of translational accommodations. Access to informational resources at higher education institutions aids Arabic-speaking international students' adaptation to their educational and social environments at their place of study. However, there are many language hurdles between native Arabic speakers and institutions of higher education in the U.S.

First, U.S. higher education features a notoriously complex lexicon (Taylor, 2020), with many native English-speaking students and support systems claiming that the language used by admissions and financial aid offices is often too complex to understand and act upon. Further, U.S. higher education is a thoroughly English-centric system, meaning that many enrollment management processes that students need to navigate are governed and explained strictly in English. In fact, recent studies have found that less than 5% of institutions of higher education communicate their admissions (Taylor & Hartman, 2019) and financial aid application processes (Taylor, 2019a, 2019b) in a non-English language. This situation has resulted in a complex, English-centric system of higher education that is incredibly difficult for non-native English speakers to navigate, especially those who are first generation college students or originate from another marginalized population (Kanno, 2018; Taylor, 2019a, 2020).

To remedy this issue and increase access to higher education for native Arabic speakers, this paper will consider the challenges faced in the translation of higher education resources from English to Arabic. In 2023, the research team partnered with administrators at the University of Iowa (Iowa) who were interested in simplifying and translating their enrollment management processes for prospective native Arabic speakers. During this collaboration, the research team worked alongside admissions and financial aid administrators and practitioners at Iowa to understand how to best simplify their information, so as not to lose critical content that may be necessary for student comprehension and process completion. These processes included submitting an admissions application and placing a housing deposit, among others. Then, the research team engaged with two machine translators (Google Translate and ChatGPT) to perform machine translations of simplified Iowa materials to explore machine translation costs and benefits. To perform the translation work to fidelity, the team partnered with native Arabic speakers to translate Iowa's materials to native Arabic, providing future native Arabic-speaking Iowa students with clear, concise information. However, during the simplification and both translational processes, linguistic hurdles were handled differently by human translators and machines, the strategies of which will each be evaluated and weighed against each other.

As a result, this study addresses the following research questions related to higher education access and the translation hurdles from English to Arabic leveraging both machine and human input:

> RQ1: What processes did Iowa follow to simplify enrollment management information meant for prospective student audiences?

> RQ2: From a baseline English text, what translation errors does Google Translate and ChatGPT make when translating higher education access materials from English to Arabic?

> RQ3: What elements of the Arabic language make English translations difficult for higher education access materials (i.e., how to apply for admission, how to apply for financial aid, how to navigate student housing contracts and on-campus student organizations)?

Addressing these questions will provide enrollment management officers and higher education practitioners with ways to simplify and work alongside native speakers of non-English languages to translate information for prospective students and their support members, no matter their language background. This process, in turn, will render the U.S. higher education a simpler, more navigable

system for native Arabic speakers, ideally increasing their access to Iowa and any other institutions seeking to practice linguistic equity for prospective students and their support networks.

Literature Review

Although many studies have evaluated the role that language hurdles can play in higher education access (Kanno, 2018; Taylor, 2019a, 2020, 2021; Taylor & Hartman, 2019), there has been no work conducted specific to Arabic speakers and their access to higher education in U.S. settings. Inversely, there have been many textbooks and peer reviewed articles written about how Arabic can be translated to English and the reverse, providing some framework for how to understand how institutions of higher education can simplify and translate their English content into Arabic content to increase access to U.S. higher education for native Arabic speakers (Al-Shawi & Mahadi, 2017; Farghal, 2015; Husni & Newman, 2015; Zakraoui et al., 2021).

Regarding translation of English to Arabic, linguists have described several distinct differences between English and Arabic that make translation difficult and problematic. First and foremost, Arabic is a right-left language, inverse from English, rendering it difficult for novice English-to-Arabic translators to understand the word order and syntax of the Arabic language (Farghal, 2017; Versteegh, 2014). Arabic as right-left poses difficulty for English translation (and the inverse) considering syntax, punctuation, and grammar, all of which differ from English and may render translation difficult.

Semantically, both English and Arabic are pronoun dense languages, meaning that both spoken and written text frequently addresses a reader or interlocuter (a person participating in a conversation) with first, second, and third person pronouns (Farghal, 2017). As pronouns can sometimes be ambiguous (unclear antecedent, gender neutral, etc.), translating pronouns from English to Arabic can prove difficult. Pronouns are also context dependent in both languages and in both languages, pronouns must agree with the number and gender of their antecedent (Farghal, 2017; Husni & Newman, 2015). Compounding this difficulty is that English and Arabic derive from difficult cultures and geographies, introducing cultural, linguistic, and idiomatic differences that English and Arabic speakers may be separately aware of but lack knowledge of each other's cultural, linguistic, and idiomatic nuances (Farghal, 2017; Ryding, 2014). As a result, basic pronoun understanding and translation from English to Arabic can be problematic.

Moreover, both English and Arabic are conjunction dense (ex: and, so, if, but, because), resulting in more translation hurdles from English to Arabic and vice versa (Farghal, 2017; Versteegh, 2014). A fundamental element of sentence construction in both English and Arabic languages is the concept of a phrase, with English phrases and clauses (or just clauses) forming complete sentences often through conjunction use. However, phrases and clauses in English contexts differ from Arabic sentence constructions, as Arabic conjunctions can connect individual parts of speech such as nouns, verbs, and adjectives, as well as connecting clauses (as complete sentences). As a result, Arabic can facilitate much more complex sentence structures than English through conjunction usage, which is problematic for English to Arabic translations and vice versa (Ryding, 2014; Versteegh, 2014).

Syntactically, sentences in Arabic syntax are dependent structurally and systematically around the predicate, which slightly differs from English notions of phrases. Arabic syntax encompasses verbal and verbless (equational) sentences, with predicates spanning various lexical categories: verbs ("We studied the book"), pronouns ("This is he"), prepositional phrases ("The book is in the kitchen"), adjectives ("The house is big"), or nouns ("These are students") (Ryding, 2014). Although verbs typically form the core of most predications, in Arabic, the verb "to be" doesn't appear in the present tense indicative, allowing other syntactic categories to fulfill the predicate or copular function in equational sentences (Ryding, 2014).

Traditional Arabic grammarists typically classify sentence types based on the initial word (noun or verb – jumla ismiyya/jumla fiʕliyya, 'noun-sentence'/ 'verb-sentence'), but they can also be categorized based on the presence or absence of an overt verb (Ryding, 2014). Verbless sentences constitute a distinct linguistic category, often termed "equational" sentences in English, with a fundamental distinction between the "topic" component (al-mubtadaʔ) and the "comment" component (al-xabar) (Al-Shawi & Tengku Mahadi, 2017; Ryding, 2014). Subsequently, English to Arabic translations may prove difficult for verb-heavy English text that may require Arabic translation into different sentence categories and verb usage.

Finally, linguists have found that many hurdles have already been uncovered regarding English to Arabic translations in medical settings (Farghal, 2015), idiomatic text (Ali et al., 2017), and machine applications (Zakraoui et al., 2021). First, considering the domain-specific nature of medical texts (ex: patient intake forms, diagnoses, medications, anatomy), Farghal (2015) found that human English-to-Arabic translations of medical text often suffered from many lexical translation errors including false additions, incorrect collocations, incorrect synonyms, and omissions. As a result, Farghal (2015) suggested that Arabic translations may inflate original English texts by word count, as many of the errors in Farghal's (2015) study resulted in a longer Arabic translation by lexical item.

Regarding idiomatic text, Ali et al. (2017) found that native Arabic speakers studying English often struggled to understand English idioms and could not accurately translate English idiomatic text. Ali et al. (2017) argued that Arabic has a rich dictionary of cultural idioms with many idioms being informal and nature and differing from culture to culture or across races, ages, genders, and religion. For instance, the English idiom, "butterflies in my stomach" was often translated as "hunger" or "stomach pain," as Arabic speakers were not familiar with the idea of butterflies being associated with nervousness or excitement in conjunction with an anatomical stomach. As a result, the Arabic speakers noted the mention of an anatomical stomach and assumed that butterflies did not belong in one's stomach and therefore was a type of malady (Ali et al., 2017). Overall, Ali et al. (2017) argued that Arabic speakers who wish to translate English text may need to learn the idiom first and then translate to Arabic, with the caveat being that many English idioms do not exist in Arabic and would likely cause confusion for native Arabic speakers unfamiliar with the English idiom.

Pertinent to the study at hand, Zakraoui et al. (2021) conducted a survey study of native Arabic and English speakers to understand Arabic-English and English-Arabic translation issues caused by reliance on machine translation. Ultimately, Zakraoui et al. (2021) found that native speakers of both languages asserted that machine translations often made lexical errors related to synonym use that human translators with context-specific knowledge would not otherwise make. As a result, the major contribution of Zakraoui et al.'s (2021) work was that translators should first simplify the target text

to reduce the lexicon and lessen the likelihood of a synonym or lexical item error: If there are fewer number of complex words in a text or the text has a lower token-type ratio, the text will be easier to translate in both directions.

Ultimately, English and Arabic are both rich languages with complex semantic and syntactic elements that render translation difficult. As a result, this study will make a novel contribution to the literature by exploring English simplification, English-Arabic machine translation, and English-Arabic human translation of higher education information to explore how English-centric institutions of higher education may render their communications more intelligible and inclusive of native Arabic speakers seeking access to higher education.

Method

This study employs an applied linguistics approach to text simplification and both human and machine translation of English to Arabic. As a result, the following sections will outline how pre-simplification text was gathered, how the text was simplified, and the processes for conducting machine and human translation for subsequent analysis.

Collecting University Communication for Simplification

To gather data for this study, the research team worked with the University of Iowa's enrollment management team including their vice president for enrollment management and their director of financial aid to consolidate their enrollment management text meant for prospective student audiences. This process involved multiple conversations with this leadership to consolidate the text to what a prospective student would need to understand to be able to successfully apply for admission, learn more about financial aid and housing, and explore campus through in-person tours and other web resources. Moreover, according to Iowa's enrollment management protocol, prospective students also needed to be aware of other sources of funding such as scholarships, housing arrangements, on-campus activities and methods of student engagement, and opportunities to tour campus with friends and family. Subsequently, the research team gathered the requisite text from Iowa's website to compile a corpora (collection of thematic texts). That corpora included website text regarding the aforementioned processes (ex: applying for admission, learning about scholarships, booking an on-campus tour). Once the corpora were created, the research team shared the corpora with Iowa's leadership. After they approved the corpora, this allowed the research team to begin simplification.

Simplification Intervention

Increasing Lexical Cohesion

The first method of increasing lexical cohesion required an evaluation of the corpora. Corpus linguistics involves the use of software programs and computers to quickly analyze, sort, and interpret large collections of text, known as corpora (Vaughan & O'Keeffe, 2015). We used Readability Studio and Python to sort the corpus by lexical item to learn which lexical items appear more or less frequently across the corpora. This procedure resulted in a word list, which "allows the user to load a corpus and investigate basic frequency patterns. This frequency view shows which

words are occurring the most regularly in a text or collection of texts," (Vaughan & O'Keeffe, 2015, p. 5). For example, the corpora may use the word "submit" more frequently than the word "complete," suggesting that submit may be a preferred term. Gaining an understanding of the lexical items in the corpus allowed the research team to understand how Iowa's text could not only be simplified but how the corpora could be simplified in a way that promotes lexical overlap, increasing the simplicity and cohesiveness of the texts.

Moreover, the corpus analysis and the generation of a word list (Vaughan & O'Keeffe, 2015) allowed the research team to identify rarely-used lexical items across each corpus, providing us with insight as to which lexical items may be removed and substituted with a different but more common or simpler lexical item across the corpus. For example, the word "feasible" may be a relatively obscure word in a corpora and could be substituted with the word "possible," which may be a more common word for prospective college student audiences. Understanding the corpora word list and the lexical diversity of the corpora assisted the research team with simplifying the corpora in a way that reduced the lexical diversity—and increased the lexical cohesion—of the corpora.

Simplifying Sentence Structure

The second method of increasing syntactic sentence similarity required an evaluation of each sentence of each text to better understand how the research team could manipulate each sentence's structure (syntax) to increase the simplicity of the overall text. To isolate every sentence of each text separately, we used Readability Studio (Oleander Solutions, 2024) and Python (Python Software Foundation, 2024) to parse each sentence into consecutive order on corresponding lines. This analysis resulted in each sentence being isolated onto its own line, allowing the team to compare each sentence to the previous sentence (if applicable) and subsequent sentence. Using our own native English speaker judgements and knowledge of domain-specific postsecondary text, we performed manual text simplification by analyzing each sentence and attempting to model a simpler sentence using a similar syntax in all subsequent sentences.

One strategy that we employed was simplifying each sentence into a shorter sentence (by word count), as extant research has suggested simplifying sentences into shorter sentences increases the comprehensibility of text (Coleman, 1962). Regarding efforts to improve sentence simplicity, Coleman (1962) suggested that when performing manual text simplification, there are four possible strategies for shortening and simplifying a sentence. Coleman (1962) reasoned that one may improve text simplification by raising clause fragments to full sentences, dividing sentences joined by conjunctions (e.g., because, but, for, or), avoiding dividing sentences joined by the conjunction "and," and shortening clauses by using periods where other forms of grammatical punctuation may be found (e.g., semicolons, colons, commas). Understanding these methods, we adopted Coleman's (1962) framework for sentence-level simplification and attempted to shorten sentences by word count to increase the simplicity of the sentence without losing critical information. It was important to explore whether sentences could be shortened, as shorter sentences inherently do not have the (potentially) complex syntax that longer sentences do—the shorter the sentence, the less likely the sentence will feature complex syntax (e.g., compound-complex sentences, multiple dependent clauses).

Using Active Voice

In addition, we attempted to increase syntactic sentence similarity of admissions and financial aid text by writing all instances of passive voice into active voice. Using Readability Studio and Python, the research team isolated all sentences written in passive voice and re-wrote the sentence using active voice (e.g., the subject performing the verb in the main clause). For example, a financial aid text could read, "The application must be completed by the student"—this sentence is written in passive voice, as the application is the subject of the sentence but is not performing the main verb of the sentence. However, this passive voice sentence could be re-written as, "The student must complete the application"—this simplification positions the student as the subject, the application as the object, and reduces the word count of the sentence by two words or 25% of the original sentence length.

Evidence from extant research suggests that writing or speaking in active voice rather than passive voice can increase the simplicity of a sentence, text, or speech and decrease the number of words in a sentence, text, or speech, ultimately producing a shorter and simpler sentence, text, or speech (DeVito, 1969; Ferreira, 1994; Myhill, 2003; Olson & Filby, 1972). Ferreira (1994) learned passive voice sentences take longer to formulate than active voice sentences, possibly rendering passive sentences more difficult to read and comprehend than active voice sentences. In addition, DeVito (1969) suggested active verb constructions "are still regarded as more basic" than passive voice constructions (p. 401), rendering active voice sentences easier to understand than passive voice sentences for many readers.

Increasing Word Frequency

The third and final method of increasing word frequency—and thus increasing the simplification of the text—required an analysis similar to that of increasing lexical cohesion. However, relying on native English speaker judgements and domain-specific knowledge of the corpora, we attempted to analyze texts at both the text- and sentence-level to understand how words could be repeated throughout a text to increase the simplicity of the overall text. Unlike attempts at increasing lexical cohesion, increasing word frequency may include repeating words in subsequent or later sentences, which may involve adding a word to a text to increase a word's frequency to assist comprehension (Hulme et al., 1997; Mandler et al., 1982; McGinnies et al., 1952; McNamara et al., 2014). For instance, Hulme et al. (1997) learned that increasing the word frequency in an informative text helped with the short-term memory recall of research participants regarding the content of the text, supporting the finding that increasing the word frequency in a text may lead to a better understanding of the text on behalf of the reader.

Pertinent to this study, Monaghan et al. (2017) also found that individual differences across bilingual readers (native Dutch speakers) in terms of word frequency effects were due to exposure to word diversity, not an individual's vocabulary size (personal lexicon). This finding supported the use of increasing word frequency to increase a text's simplicity and possible readers' comprehension of the text (Monaghan et al., 2017). As a result, we attempted to detect content words that could be repeated earlier or later in each text separately, and then we added these words into the text while maintaining the grammaticality of the text, possibly increasing its simplicity.

Related to but not directly addressing specific simplification methods for second language learners, we attempted to locate acronyms (e.g., Free Application for Federal Student Aid [FAFSA]) and initialisms (e.g., GPA) and insert definitions (elaborations) of these acronyms and initialisms if they were not already present in the text. Research on acronyms and initialisms has found that using these lexical items in potentially unfamiliar text can be confusing to readers, thus making the text more difficult to read (Cannon, 1989; Grange & Bloom, 2000; Ibrahim, 1989; Rúa, 2002). Researchers have stated that using acronyms often comes "at the price of clarity" (Grange & Bloom, 2000, p. 1), as the reader may need to parse extra text or consult another text in order to decipher the acronym or initialism and fully comprehend the text (Altmiller, 1982; Rúa, 2002; Taghva & Gilbreth, 1999).

Advances in computational linguistics have provided many tools to recognize acronyms and their definitions, ensuring that texts contain both the definition of the acronym (e.g., FAFSA) and the acronym itself to optimize reading comprehension of the text (Taghva & Gilbreth, 1999; Xu & Huang, 2007). Laszlo and Federmeier (2007) posited that it is crucial for readers to be able to move rapidly from print to meaning to optimize reading comprehension, and the embedding of unfamiliar acronyms and initialisms often slows that process for readers, especially those unfamiliar with the type of text or the lexicon of the text. Given that admissions and financial aid communication is a unique type of text that often employs a unique lexicon (Taylor, 2018, 2019a, 2019b, 2020), we simplified texts in this study by inserting extra lexical items that were not present in the original, pre-simplification text, as such adding the definition or elaboration of an acronym or initialism, in order to increase the simplicity of the text.

Once the text was simplified, the research team met with the University of Iowa's enrollment management team, including their vice president for enrollment management and their director of financial aid, to gain a subject-matter acceptability judgment of the simplified text. After review, institutional leaders provided a verbal acceptability judgment of the simplification, and the research team was able to proceed to machine and human translation from English to Arabic. Overall, the original text scored at the 11.8th grade level on the Flesch-Kincaid Grade Level Test in 1,851 words across 120 paragraphs. The simplified text scored at the 10.7th grade level on the Flesch-Kincaid Grade Level Test in 1,471 words across 107 paragraphs, suggesting the simplification intervention was effective.

Human and Machine Translation

Using the Iowa-approved simplification, we engaged with two different machine translators: Google Translate and ChatGPT 3.5 (January, 2024). Then, we engaged with three different native speakers of Arabic to perform human translation of the simplified text. Once each human was finished, each native Arabic speaker provided a blind peer-review of the English-to-Arabic translation to guarantee accuracy. Ultimately, all three native Arabic speakers agreed upon the human translation of the simplified English-to-Arabic document.

Findings

Analysis of Text Simplification

After simplification, machine translation, and human translation of English-to-Arabic higher education information, several main findings emerged from the data. To begin, we will address elements of the simplification process from complex-to-simple English. Before translating a text, one must consider how easily the current structure and language used in the original text would carry over to the target language. Often, this will involve adjusting the source text's language to reach its meaning in the simplest of terms to ensure the necessary information will be conveyed to readers of the target language.

During the simplification process, ideas perceived as technical or those that have little context outside that of higher education were replaced with more accessible terms. In the original text, Iowa officials chose to use the word "disbursement" when discussing the distribution of financial aid to students. In the simplified text, however, the words "receive funds" are used instead. This took the technical term "disbursement" (releasing financial aid from federal or institutional accounts to student financial accounts) and used far simpler words to concisely describe what will be done with students' financial aid. This decision not only makes the term easier for English readers to understand but makes the translator's job more straightforward as well. In addition to simplifying technical terms, there are some informal phrases and ideas that needed simplification before translation. The original text states "The University of Iowa has over 600 student organizations and dozens of community groups which students can join, including dozens of groups centered around underrepresented minority students and first-generation college students." The idea of an organization being "centered around" certain students is a very English phrase. The simplified text reads instead "dozens of groups for underrepresented minority students." This removed the unnecessary verbiage of the original text and made it easier to translate the idea into Arabic.

The simplified text also makes more use of the second and first-person points of view, as opposed to the original which tends to use third-person when referring to the University and students. In the original text, the University will refer to itself as "The University of Iowa" and the readers as "students." Although not inaccurate, use of these nouns is repetitive and unnecessarily lengthens the text. The simplified version will instead use "we" when referring to the University and "you" when addressing students. This removes the repetition of the original and establishes a more direct, personal voice in the new text. This use of personal pronouns, along with the other means of simplification, have been carried over into all Arabic translations of the text, helping ensure ease of reading for prospective Arabic-speaking students. Overall, readability and text statistics suggested that by complexity (grade level) and length (word and paragraph count), the Iowa corpora was simplified, rendering the corpora both easier to translate and possibly easier for native English speakers to read and comprehend.

Comparative Analysis Machine Translations of Google Translate and ChatGPT

After conducting machine translations of the simplified Iowa information, there were several inconsistencies between the Google Translate and ChatGPT versions. Both translations were mostly accurate, with a few caveats. Most issues and inaccuracies on the part of the machines were caused

by a lack of critical thinking and understanding. There are conventions in the English text that don't exist in Arabic that Google Translate and ChatGPT handled differently and, often, incorrectly.

Transliteration

When translating from one language to another, we often found that English words and concepts had no equivalent in Arabic. If the source language and the target language share the same alphabet, one of the most common ways to overcome this issue is to simply leave the "untranslatable" word in its original language. English and Arabic, however, do not share the same script. The characters used in the two languages, in fact, look radically different. If an Arabic reader were to see English letters in an Arabic text without knowledge of the Latin alphabet, they would have no way to read the word. In this instance, a translation may call for "transliteration." This is the act of using the characters of the target language to convey to readers how the word would sound in the source language. Through this process, a reader should be able to pronounce foreign words using their own script.

In this study, there were multiple instances in the text when Google Translate and ChatGPT utilized translation when they did not identify a word as one that could be translated into Arabic. There were, however, several errors and inconsistencies the machines made when recognizing words that should be transliterated. The first English word that neither machine had a single word to which it was equivalent was the word "regent." In the case of the English text, "regent" was referring to a board of directors that sees over the three major public universities in the state of Iowa. Google Translate had two different approaches to translating this word into Arabic. Upon its first use in the text, the machine chose to transliterate the English word "regent" to ",ريجنت" its phonic equivalent in Arabic script. In the very next line of text, however, the word appears as "regent", only for the transliteration to be again used later. ChatGPT, on the other hand, had a different strategy. Instead of leaving the word in English or choosing to transliterate it, ChatGPT opted to create a definition in Arabic words. The machine translated "regent" to " المجلس التنظيمي." which means "regulatory board." This was the case in all uses of the word in the ChatGPT translation.

The Iowa Edge Program (a college transition program for students of Color) program for minis another English phrase the machines had trouble reproducing in Arabic, specifically struggling with the word "Edge." Google Translate, once again, chose to transliterate "Iowa Edge" to ",آيوا إيدج" The transliteration of a state, such as Iowa, is common in Arabic, but the machine recognized "edge" as a proper noun as well, deciding it would be best to transliterate the word, rather than literally translating to the Arabic equivalent. ChatGPT also recognized this proper noun but opted to leave it in its English form "Iowa Edge." As a result, prospective students or families who are native Arabic speakers may struggle to understand the nature of the Iowa Edge Program and whether the prospective student may want to participate in the program in the future.

Acronyms

Acronyms are commonly used in English, relative to other languages, especially Arabic. Although acronyms do exist in Arabic, they are rarely used outside of the context of names of corporations and organizations. Because Arabic has no capital letters and all the letters in a single word are connected to one another, an acronym that is not originally in Arabic, but taken from English, could

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be difficult for a Native Arabic speaker to recognize. For the most part, Google Translate and ChatGPT were able to identify English acronyms and left them in English letters after translation. There were, however, several issues that arose with specific acronyms in different contexts.

In translating the acronym "SAT," Google Translate first recognized the word as an acronym, leaving it in English for its first use. In the same line, the machine doesn't register SAT as an acronym, instead translating it to "*السبت*," the Arabic word for Saturday. There also arose an issue with the acronym "RAI" (Regent Admission Index). In addition to the definition specific to the University, there is the more widely known meaning of "Radioactive Iodine Therapy." Although Google Translate did correctly identify RAI as an acronym, it incorrectly assumed that it was referring to the former. In the Arabic translation, Google chose to translate this to "*اليود المشع*," or "radioactive iodine, though it left the acronym in English later in the text. Not only did the machine choose to define the acronym, but it used the wrong words entirely.

Although Google Translate left some acronyms in English and mis-translated some into Arabic, ChatGPT left all the English acronyms in the original language and format. This approach does leave them in a state in which they would be recognizable as acronyms, but there is an issue in figuring out what exactly they stand for. In the Google translation, the English words "Regent Admission Index" are translated to "*مؤشر قبول ريجنت*," roughly meaning "regent's admissions index." While this does nicely capture the English meaning, when the acronym "RAI" does appear in the Google translation, there is nothing that indicates these two are connected. The only word in the Arabic translation that corresponds phonically with any part of the acronym is "*ريجنت*," which is a transliteration of "regent." The other two words in the phrase begin with sounds that don't at all resemble the rest of the English acronym. This makes it difficult for future students to recognize the acronyms for programs whose names they have only read in Arabic.

Colloquialisms and Metaphorical Speech

Moreover, the machine translations did not always produce accurate translation at the word or semantic level, as there were words in the simplified English version of the text that did not exist in Arabic or needed transliteration to be intelligible. Google Translate and ChatGPT don't always detect colloquialisms and metaphors, often translating them fairly "literally," resulting in the meaning not always coming across in Arabic the same way it does in English. The first words that greet the reader in the English text are "This is the University of Iowa." In English, this is a commonly used phrase in advertisements and the world of higher education institutions. When both Google Translate and ChatGPT were given this line, it was translated as "*هذه جامعة هيوا*," which is a completely literal translation. Although this phrase is common and recognizable in English, this is not something used in Arabic. This is not a colloquialism that would be completely lost on Arabic readers, but it is not a very accessible expression with which to welcome prospective students.

The English text also uses the expression "a vibrant campus in the heart of Iowa City." Both Google Translate and ChatGPT kept this line literal, translating it to "*في قلب مدينة أيوا*," which directly translates to "in the heart of Iowa City." Although the machines chose to literally translate these words, this is a case in which the expression exists both in English and Arabic. The word "*قلب*" can be used in Arabic in the same ways it is used in English, as it can refer to the organ or something more abstract like feelings and, in the case of this expression, the location of the University being in

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the central part of the Iowa City. Though this expression's meaning was carried across languages after translation, we can't say that either machine can recognize this, as this saying is the same in English and Arabic. Translation machines are not able to take a saying like this from one language and find its equivalent in another unless it just so happens that it can be translated literally. It is clear though that machines still fall behind in recognizing and accurately translating colloquial speech.

When comparing both machines, it was clear the two AIs handled the linguistic hurdles they encountered differently. Google Translate was more prone to transliterate words that it did not find an Arabic equivalent to but ChatGPT would come up with a new definition. Google was also less able to recognize acronyms as it would, on occasion, transliterate the English acronym or translate it incorrectly. ChatGPT seemed to recognize the English acronyms, leaving them in their original language. Both machines also don't seem to be capable of translating colloquial expressions, as they both chose to literally translate any instance of this. Although Google Translate and ChatGPT did provide fairly accurate translations, there are some major recurring errors that should not be overlooked when translating higher education resources.

Comparing Human Arabic to Machine Arabic Translations

The Google Translate and ChatGPT translations were quite accurate in a sense of meaning but have been shown to make errors when having to decide context that exists outside of the text. Although both machines can take some context into account, the issue arises when the AI decides meaning on its own through critical thinking. The machine will often either not use outside context or make an incorrect judgement call. It is here that human translation surpasses that of machines. The translation of Iowa's enrollment information performed by a native Arabic speaker shows this. Not only does it provide a more accurate, accessible translation, but it does not share some of the previously highlighted mistakes made by Google Translate and ChatGPT.

Colloquialisms and Metaphorical Speech

We can see the difference between human and machine translators from the very beginning of the text. The line "This is the University of Iowa" is translated literally in both machine translations, but the human translator handled this differently, instead translating this line as "مرحبا بكم في جامعة آيوا," which means "welcome to the University of Iowa." This is a much more commonly used phrase in Arabic than the literal translation the machines produced, and it is much more accessible and welcoming to any Arabic reader. The human translator also chose to translate the expression "in the heart of Iowa City" literally as Google Translate and ChatGPT did, since this saying exists in both languages.

There is a point in the text where it references resources and organizations for minority students. In the English text, the terms "students of Color" and "Black" are used, and the two machine translations use these words as well. The human translator, however, translated both terms to "African American." Although the two terms in the English version are commonly used general descriptions in English, colors are used to describe people much more specifically in the Arab world, as a wide range of words are used to describe specifically the color of one's skin rather than the more American idea of race. The terms "students of Color" and "Black" were likely changed to

"African American" to convey this idea of race to Arabic readers, though the term does lose some of the meaning the original English carried with it.

Acronyms and Transliteration

The Google Translate and ChatGPT translations demonstrated that the two machines had different ways of translating acronyms and words that don't have an Arabic equivalent. The human translator took the same approach to acronyms as ChatGPT did, leaving the Acronyms in English. This decision was likely made because the student will see these acronyms in the original English in the future, as they would be unrecognizable if they have only seen an Arabic translation of the acronym, however that may appear. Both the human translator and ChatGPT were able to consistently identify acronyms and left them in English, but Google Translate had more issues with this task, as previously shown. There still does exist the issue that the English letters don't align with the sounds the Arabic words for the acronym make, and there is often little indication within the text that a certain acronym corresponds with a certain definition.

When it came to translating singular words that don't exist in Arabic, the human translator often chose to transliterate them as Google Translate did. Both the human and Google translations chose to transliterate the words "regent" and "Iowa Edge," but ChatGPT constructed an Arabic meaning for "regent" and left "Iowa Edge" in English. It is likely the human translator recognized these words both as proper nouns that should not be translated literally. ChatGPT was somewhat inconsistent in this decision, as leaving the name of the "Iowa Edge" in English demonstrates its identification as the name of a program and defining "regent" shows it was recognized as just a word. Though they took different approaches, all the decisions on when to transliterate words are accurate. This issue comes down to needing the ability to identify "untranslatables" and a consistent strategy to translate them.

Sentence Structure

The two major Arabic sentence structures are nominal sentences (jumla ismiyya) and verbal sentences (jumla fiʕliyya). In a nominal sentence, the subject will come first, followed by the verb and the object. A verbal sentence will instead follow the order of verb, subject, object. Although neither is more grammatically correct than the other, there are some instances in which one would choose to use one of the structures. When first choosing which structure to use, a speaker or writer will want to consider if they want to emphasize the subject or the action. A nominal sentence will bring to the forefront the subject of the sentence, but a verbal sentence will highlight the action. If someone has already established the type of sentence structure they are using in text or speech, they would want to remain consistent and use the same structure throughout. Of the three translators, only ChatGPT chose to use nominal sentences throughout the text. Both the human translation and Google translation use verbal sentences instead. Though neither is more grammatically correct than the other, the use of verbal sentences in this text could be more contextually correct. The text is an informational resource about enrollment for prospective students at Iowa, meaning it includes a lot of instructional material. The text tells readers how to apply for admission and financial aid, as well as the different organizations they can join. The use of verbal sentence structure puts emphasis on the actions readers need to take rather than the students themselves further supports the nature of this text as an informational resource.

Although neither of the machine translations are wildly inaccurate in meaning throughout, there are moments that can disrupt a reader's experience and their understanding of the text. These issues come mostly in the form the machines' lack of ability to translate English conventions to Arabic so that an Arabic reader could understand them. This is where a human translator is needed, as the recognition of these elements of speech and writing as well as the knowledge to translate them in a way Arabic readers would grasp is critical to ensuring an accurate, accessible translation.

Conclusion

Researchers have emphasized the importance of crafting institutional policies that are inclusive for individuals from diverse language backgrounds (Shirahata & Lahti, 2023), and as the U.S. continues to diversify by race and language, the need for accurate methods of translation for secondary education resources is more prevalent than ever. In the case of the University of Iowa, there was a need for the simplification and subsequent translation of enrollment information from English to Arabic. In addition to the translation for the University performed by a human translator, the research team utilized Google Translate and ChatGPT to identify the errors machine translators make when compared to humans. There are conventions and nuances of both the English and Arabic languages that make the two difficult to translate accurately between, and these are especially important to pay attention to when translating informational resources.

The issues identified by the findings of this study demonstrate, in action, the linguistic hurdles highlighted by previous research on the translation of English to Arabic. The clear structural and syntactical differences between the two languages offer issues for anyone trying to translate or read one language or the other should they not be extremely familiar with both. In addition to this, English and Arabic have such distinct cultural and historical backgrounds that finding ways to translate idiomatic language and expressions in a way native readers will understand can offer a challenge to the most confident translators. We also find in this study that acronyms and English terms that exist mainly within the world of higher education are difficult to translate to Arabic. Human translators can identify these issues and make translation decisions based on their ability to take outside context into consideration, but these nuances are less likely to be handled properly by translation machines.

Leaders of institutions of higher education that seek translations of resources for prospective and current students are best off utilizing human translators rather than relying on machine translation. Although AI like Google Translate and ChatGPT have the capabilities to accurately translate certain texts, they struggle to communicate the nuances of most languages. This is especially true when translating from English to Arabic. Machine translation is not yet at the point where it understands Arabic as it does other languages, and given the differences between English and Arabic, there can be some major misunderstandings. When translating texts like the enrollment information, higher education institutions need to be aiming for a level of accuracy that machines haven't yet achieved. Not only do the Arabic readers not understand the English languages, but there exist terms within the context of higher education that prospective students may not be familiar with. There needs to be some level of human thought and decision put into the translation of these niche terms and "untranslatable" words and ideas to ensure the accessibility of higher education.

Moreover, leaders of institutions of higher education ought to partner with non-Native English speakers when embarking upon translation projects to effectively send the message that the people leading the institution value the people and cultures seeking access to the institution. Surely, as artificial intelligence and machine translation continue to improve with training, institutional leaders could simply choose to employ the machines and reject human input. Yet, this decision is a fundamental choice to prioritize profits over people and a celebration of machines rather than ushering in a new era of linguistic inclusion and translation of a U.S. system that should not be as Anglocentric as it always has been.

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