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Linguistic Assessment of AI Translation of Technical Texts from English to Arabic: Appliance Instruction Manuals as a Case Study

Mohammed Hamdan[1,*], **Rami Qawariq**[1], **Mayada Arabasi**[1] **& Dima Snober**[1]

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Abstract: Objectives: This article provides an assessment of AI-assisted translation of appliance manuals from English to Arabic, with a particular focus on instruction manuals of Moulinex Company products. It aims to identify different levels of linguistic inaccuracies that appear in ChatGPT-4o's translation of these texts and demonstrates how these inaccuracies cause a loss in the communicative function of these texts. In light of this assessment, the article highlights the importance of adopting supportive human translations to maintain the pragmatic functions of technical texts by paying enough attention to their distinctive linguistic and textual features. **Method:** To achieve its objectives, the article adopts a descriptive-analytical approach through which the data are classified into two main categories: lexical and textual. The assessment of these levels is conducted with reference to Nida's theoretical model of functional equivalence. **Results:** The research reveals that AI generates problematic versions of the translated data from English to Arabic, which stems from undermining the technical context at the lexical level and disregarding the Arabic preferences of cohesion and coherence at the textual level. **Conclusion:** Based on these findings, the researchers recommend adopting a hybrid human-AI approach to translate appliance instruction manuals.

Keywords: Appliance Manuals, ChatGPT-4o, Technical Translation, Moulinex Company, Nida's Functional Equivalence, Human Translation

التقييم اللغوي لترجمة الذكاء الإصطناعي للنصوص التقنية من الإنجليزية إلى العربية: أدلّة تعليمات الأجهزة نموذجًا للدراسة

محمد حمدان[1،*]، **ورامي قواريق**[1]، **وميّادة عرباسي**[1]، **وديما صنوبر**[1]

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الملخص: الأهداف: تقدّم هذه المقالة تقييمًا لترجمة الأدلّة الإرشادية للأجهزة من اللغة الإنجليزية إلى اللغة العربية بمساعدة الذكاء الاصطناعي، مع التركيز بشكلٍ خاص على كتيّبات التعليمات الخاصّة بمنتجات شركة مولينكس. تهدف المقالة إلى تحديد مستويات مختلفة من الأخطاء اللغوية التي تظهر في ترجمة نموذج ChatGPT-4o لهذه النصوص، وتوضّح كيف تتسبّب هذه الأخطاء في فقدان الوظيفة التواصلية للنصوص الأصلية. في ضوء هذا التقييم، تُبرز الدراسة أهمية اعتماد ترجمات بشرية داعمة للحفاظ على الوظائف العمليَّة للنصوص التقنية، وذلك من خلال إيلاء الإهتمام الكافي لخصائصها اللغوية والنصيَّة المميّزة. **المنهجيّة:** ولتحقيق أهدافها، تتبنى المقالة منهجًا وصفيًا تحليليًا تُصنّف من خلاله البيانات إلى فئتين رئيسيتين: المعجميّة والنصيَّة. يتمُّ إجراء تقييم هذه الفئات بالرجوع إلى نموذج نايدا النظري للتكافؤ الوظيفي. **النتائج:** وتكشف نتائج الدراسة أنّ الذكاء الاصطناعي ينتج ترجمات إشكالية لهذه النصوص من الإنجليزية إلى العربية، تعود في جانب منها إلى تهميش السياق التقني على المستوى المعجمي، وفي جانب آخر إلى إغفال الخصائص الأسلوبية المفضّلة في اللغة العربية من حيث التماسك والاتساق النصي. **الخلاصة:** وبناءً على هذه النتائج، يوصي الباحثون باعتماد مقاربة هجينة تجمع بين الترجمة البشرية والذكاء الإصطناعي عند ترجمة أدلّة استخدام الأجهزة المنزلية.

الكلمات المفتاحية: أدلّة الأجهزة، ChatGPT-4o، الترجمة التقنيّة، شركة مولينكس، التكافؤ الوظيفي لنايدا، الترجمة البشريّة

1 Department of English Language and Literature, College of Humanities and Educational Sciences, An-Najah National University, Nablus, Palestine.
* Corresponding author: moh_hamdan@najah.edu

1 قسم اللغة الإنجليزية وآدابها، كلية العلوم الإنسانية والتربوية، جامعة النجاح الوطنية، نابلس، فلسطين.
* الباحث المراسل: moh_hamdan@najah.edu

Introduction

Similar to most fields related to human action and interaction, AI has begun to impact the realm of translation by offering automatic translation systems that facilitate the translation process in terms of speed and accessibility. Nonetheless, questions regarding the accuracy of AI-powered translation, contextual understanding of the source text (ST), and linguistic adherence to the target language (TL) remain unresolved. This appears to be true in rendering technical texts, which show a clear tendency to use a target-oriented language that takes into account elements of accuracy and comprehensiveness. This means that technical texts should be approached clearly and accurately, especially when these texts are particularly instructive in nature as they facilitate the audience's use of a given equipment or tool. As technical texts have multiple pragmatic functions, precision of linguistic choices and textual styles is believed to be a key concern for translators (Kizi and Oybekovna, 2021). In simpler terms, the formal and semantic constructs of technical texts are important sites for the transmission of their pragmatic force to the audience, which requires especial treatment of the texts' linguistic structure in the process of translation. This assumption, as the following sections will demonstrate, underlies the theoretical and methodological frames of this study. The study conducts a systematic assessment of the linguistic choices and stylistic features of the translations of technical texts in light of their (in)ability to maintain the source texts' pragmatic functions. To do so, the study examines the possible applicability of AI (ChatGPT-4o) to translating technical texts, with a special focus on rendering chosen excerpts from appliance instruction manuals that pertain to microwaves, ovens, and irons which are owned, advertised, and sold by Moulinex Company.

While it reflects on ChatGPT-4o's translation of these excerpts, the study identifies problems of such translations at the lexical and textual levels and the impact of these choices on the pragmatic function(s) of the texts. As there is no direct contact between the addressor and the addressee, which implies restricted contexts of communication, the study assumes that precision, adequacy, and appropriateness of the linguistic and stylistic choices are *the* key aspect that reflects the ability of these texts to convey their pragmatic functions.

Translation of Technical (Instructive) Texts

Technical texts mostly operate as forms of communication that inform the addressees – here consumers – about products and provide instructional methodologies to perform certain activities (Ababilova, 2024). This overarching function of technical texts subsumes different pragmatic functions, namely informational, cognitive, persuasive, explanatory, referential, communicative, and didactic functions (Kizi and Oybekovna, 2021). As Vandepitte (2008) argues, being oriented to particular groups to address their needs for different types of equipment, instructive texts do not only provide information for readers but also persuade them to act in a certain way. Therefore, researchers propose that regardless of what the pragmatic function is, linguistic and stylistic features of technical texts must enhance the informativity of these texts (Slepneva, 2023). Precision and adequacy are, accordingly, observed to maintain the factual reliability of the text, which becomes necessary for effective communication in scientific and technical contexts (Podolkova, 2021).

Due to the growing role of scientific and technical texts in today's industrial transactional communication, translation of technical texts has become one main domain of human communicative practices (Ababilova, 2024). However, the challenges that arise from the distinctive features of technical texts, especially the impact of precise linguistic and stylistic choices on the pragmatic functions of these texts, impose further challenges for translators who are supposed to have sufficient

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knowledge in the subject matter, so that the text's function of informing and persuading addressees is successfully rendered to the target text. Accuracy of word choice and the employment of a consistent and logical stylistic structure that motivate comprehension and usability are key textual and pragmatic aspects that underlie the adoption of translation strategies (Diachuk and Biliuk, 2024). In this sense, rendering technical texts require discourse-level translation strategies that apply different procedures, such as substitution, repetition, and inversion, to improve coherence and user comprehension (Ping, 2024). The systematic processing of formal textual aspects acts as the core pragmatic function that relates to readers' involvement to improve their perception and participation (Mulder, 2015).

It can be concluded, therefore, that inaccurate (formal) language choices may cause a loss as they reveal the translated texts' incapacity to maintain the intended functions of the ST. Sjöholm (2013), for instance, examines the readability and applicability of translated manuals, emphasizing the pragmatic changes through omissions, additions, and substitution in Finnish translations of the English texts, which influence users' understanding and the overall content effectiveness. Sjöholm maintains that some procedures enhance readability, while others cause confusion and misunderstanding. The pragmatic modifications in technical translation, as such, often adversely affect usability and readability by creating contrasting expectations. As Azman (2019) suggests, textual inaccuracies in the translation of instructive texts such as poor word choice and incorrect sentence structure are more likely to cause a severe loss in the communicative function of the translated texts and, therefore, lead to practical problems that may – in some cases – be serious and harmful.

As Arabic and English have distinctive grammatical structures, translators have managed to identify particular challenges in the translation of technical texts between these languages. Hetam et al. (2024), for example, evaluate the quality of the translation of safety manuals from English to Arabic. They highlight the challenges that translators face when rendering these texts due to the linguistic and grammatical differences and the lack of equivalence for technical or scientific terms in Arabic. They contend that mistakes related to lexical suitability significantly change the intended meaning of the ST. Subsequently, the authors maintain that translators should be expert in the subject matter to weigh the loss in relation to the intended communicative function and, then, choose the best strategy that makes up for that loss.

In the same vein, Abdulrahman (2015) examines the translation of canned and packed food product labels from Arabic to English. In shedding light on linguistic incorrectness through the process of translating culture-specific terms, the author points out that the lack of appropriate equivalents can impede successful communication. Similarly, Saeed (2024) argues that translator trainees face serious challenges in rendering scientific and technical texts from Arabic to English. This mainly relates to their (in)ability to render orthographic, grammatical, and syntactic features. The findings of the study underscore the importance of specialized training programs to enhance the translators' competency in the textual and stylistic features of the technical texts, the role of these features in the realization of the pragmatic functions, and the translation strategies that efficiently manage the textual and stylistic differences between English and Arabic.

AI in Technical Translation

With the growing role of computer software in facilitating translation, a remarkable number of research projects have started to investigate the ability of recent technological affordances to tackle the

linguistic and textual complexity of human language in translation. In general terms, researchers still believe that human-independent translation that maintains all communicative aspects of texts is still unattained, and that approaches that mix both human and AI translations are more effective and successful. For instance, Chetioui (2024) outlines the deficiencies of machine translation (MT) in re-constructing all linguistic and textual peculiarities of the technical texts. The linguistic complexity of these texts, as noted by Chetioui, imposes a serious problem for MT translation, and it is only a human translation that can provide a linguistically sound and a contextually appropriate translation. In the same context of inquiry, Fuentes-Luque and Urbieta (2020) and Kasperė et al. (2024) investigate the effectiveness of MT systems in translating tourist texts (guidebooks) and medical instructive texts. These analyses show that though MT can generate grammatically correct translations, it often lacks the cultural nuance and contextual understanding provided by humans. Pragmatic functions that are expected to be performed by the texts are, therefore, considerably distorted. In a similar fashion, Kasperė et al. (2024) identify patterns of inconsistencies in MT's rendering of medical texts that relate to inappropriate word choice, which ultimately hinder readability and comprehensiveness.

Other researchers have examined the more recent programs of AI and whether they can provide an alternative for human translation of technical texts. Pukene et al. (2024), to exemplify, analyze AI translations of tourism massages, which are compared with human translations of the same texts. The authors reveal that AI tools excelled in speed but struggled with nuanced issues. Therefore, a balanced approach of human expertise and AI capabilities is essential for enhancing translation quality in tourism, ultimately improving cross-cultural communication and traveler experiences. In a different study, Hasyim et al. (2021) show how AI translation reflects a good level of efficiency regarding the use of words, phrases, and sentences by providing a literal translation. Yet, literal translation occasionally leads to wrong word choices that violate the precise meaning of the ST's terms, thus failing to capture the intended meaning.

In light of the above literature, it can be argued that linguistic specificity of technical texts that is essential to convey precise meanings is still a challenge for AI translation, including the newest and most advanced applications. However, most of the literature has focused on the incorporation of AI in rendering legal and literary texts, given the complexity of the language used in such fields which call for attention on the part of researchers in the field of translation studies. In contrast, the examination of AI in technical translation has been generally neglected, and the few available studies focus mainly on text types that can challenge cross-cultural communication, especially in the fields of medicine, cooking, and tourism. This highlights the need for a systematic examination of the efficient employment of AI translation of appliance instruction manuals from English to Arabic. More specifically, this study sheds light on the (in)ability of AI to render the linguistic and stylistic features of technical texts in a way that maintains their informativity and persuasiveness. This study, therefore, contributes to this field of research by providing an assessment of ChaGPT-4o-assisted translation of instruction manuals of Molineux Company products. Choosing ChaGPT-4o as a venue to translate technical texts can be justified on the basis of its popularity and simplicity, thus offering a comfortable experience for users. To provide a coherent, systematic, and scientific analysis of AI translation, the article deploys Nida's concept of functional equivalence as a general theoretical reference.

Nida's Functional Equivalence

To achieve the research objectives, the researchers opt for Nida's functional equivalence as a general framework for the present analysis. The rationale behind adopting this concept is based on its particular

tendency to offer explications of the "recipient-oriented" nature (Shi, 2014, p. 2), which comprehensively and significantly takes into account the target language and target culture in the process of translation (Huang, 2017, p. 2). Additionally, Nida's conception of functional equivalence is concerned with the practicality of translation as it investigates the effect the translated texts have on their audience (Jiayuan, 2019, p. 46). Functional equivalence aims to recreate the information presented in the SL in the closest and most natural equivalence (Hao, 2024, p. 321), which aims to achieve the same communicative function in the translated text as originally displayed in the ST (Ilkhomovich & Muhtasar, 2024). For that end, a number of translation procedures are available for translators to achieve a high-quality translation that corresponds or matches the ST communicative function, such as addition, deletion, and modification (Fan, 2017). As for formal equivalence, it focuses on ensuring that the formal structure of the TL closely aligns with that of the SL (Tan, 1999). However, as stated by Shi (2014), Nida emphasizes that formal equivalents do not always exist between different languages. Nida (2001) states that formal correspondence can change the grammatical and stylistic patterns of the target language, and this potentially leads to misunderstandings for readers. Therefore, if formal equivalence affects how meaning is expressed, moving away from formal equivalence and pursuing functional equivalence becomes essential. In this regard, the researchers in this article analyze and provide a critical assessment of AI translation of the manuals by evaluating the translation of linguistic and stylistic aspects with reference to the intended pragmatic functions of the texts. To do so, it is necessary, as the following section shows, to adopt a methodology that investigates the correlation between linguistic/stylistic choices and the pragmatic functions of the translated texts.

METHODOLOGY

Data Collection

The data of this study consist of appliance manuals made to advertise for a number of Molineux company products, including microwaves, ovens, and irons, which were collected using a purposive sampling technique. The decision to focus on Molineux products was driven by the company's global reputation for producing high-quality and widely-used appliances. As Molineux products are distributed internationally, they cater to a diverse audience. This global reach makes the accurate translation of these manuals essential. In addition, the researchers selected the manuals specifically for microwaves, ovens, and irons as these products are staples in nearly every house. Since these products target a large audience considering their affordability and accessibility, the language of the manuals is assumed to facilitate their use, which poses technical and practical challenges for translators.

Methods of Analysis

This study examines AI translation of technical texts and focuses on ChatGPT-4o's treatment of linguistic (word-level) and stylistic (discourse-level) choices to examine how these textual aspects (un)successfully maintain the pragmatic function(s) of the source text. To do so, the researchers collected data from the manuals of ovens, microwaves, and irons, written in English, from the Molineux company website and used ChatGPT-4o to translate them into Arabic. Then, the researchers thoroughly read the translated texts and analyzed them by identifying common translation mistakes. Here, mistakes at the lexical and textual levels were identified and classified into two categories: lexical (including word choices, collocations and hyponymy) and textual (mainly focusing on discourse issues). The first step of analysis involves a comprehensive description of these choices in terms of their semantic meaning and sense relations. These meanings and relations are compared, at the semantic level, with their English counterparts so that all nuances related to differences in meaning

are identified. Finally, at the discourse level, the analysis identifies the pragmatic function(s) of the ST, and subsequently investigates whether the word-level language choices manage to maintain these functions in the TT. In detecting and examining the functionality of the translated texts, the analysis draws on Nida's notion of functional equivalence, which is a functional equivalent theoretical perspective through which the researchers propose that translating lexical choices must carefully reflect whether these choices serve the pragmatic functions of the translated items in the ST and, thus, contribute to an informative equivalent translation (Fan, 2017). This is supposed to regulate the analysis as the final aim or eventual outcome of this research is not to test the formal correspondence between the ST and the TT, but rather to examine how inappropriate and inaccurate language choices can passively impact the pragmatic functions of the manuals.

DATA ANALYSIS

Between AI and Human Choices: Words and Meanings

Word choice implies an intentional and precise selection of words which is meant to suit the target audience, goal, and topic so that the author can convey his/her meaning and message to the readers (Widodo, 2017, p. 22). In translating instruction texts, word choice is crucial, and the unsuitable selection of terminologies may generate ambiguities in the overall meaning and lead to misinterpretation. In this context, the main finding of the analysis shows that inaccurate single words, collocations, and hyponymy passively affect the aggregate function of the translated material. In other words, the analysis reveals that word-level inconsistencies and inaccuracies are structurally related the failure of the TT to inform and persuade readers.

In the following example, it can be noted that ChatGPT-4o's literal translation of the technical term "transparency" into its direct meaning in Arabic (*shafāfiya*) causes a lexical issue as it disregards its technical context. The translation does not only cause difficulty in grasping the meaning but also creates ambiguity, thus highlighting the importance of lexical accuracy and the necessity of human intervention to adapt technical terms to an appropriate or suitable context for Arab consumers:

ST: Use containers suitable for microwave cooking. A container can easily be tested for microwave "transparency" (Molineux, n.d., p. 15).

AI translation: استخدم أوعية مناسبة للطهي بالميكروويف. يمكن اختبار الوعاء بسهولة لمعرفة ما إذا كان "شفافًا" للميكروويف (OpenAI, 2024).

This translation can cause difficulties in many different ways and lead to ambiguity. According to *Almaany* Dictionary (Arabic dictionary), the word transparent (*shaffāf*) is an attribute that describes material objects that allow light rays to pass through, enabling things behind them to be clearly distinguished. Transparency (*shafāfiyya*), on the other hand, means the ability of an object to show or reveal what is obscured behind or within. The latter is also metaphorically used to refer to a person revealing their private thoughts or feelings (*Almaany* Dictionary, n.d.). Thus, translating "transparency" into Arabic in the context provided above as "شفافًا" could lead to confusion because "transparency" does not refer to the visual transparency of the container. The exact meaning of the term is thus partially created by its relations in the co-text (see Nida, 1964). In this sense, "transparency" in the above example refers to the container's ability to allow microwaves to pass through the container without absorbing heat, which could be better rendered as "نفاذية" (*nafādiyyah*), which makes an accurate lexical equivalence. This translation better conveys the idea that microwaves can pass through the container's material, which necessitates a revised translation to استخدم أوعية مناسبة للطهي في الميكروويف،ويمكنك بسهولة اختبار *نفاذية* الوعاء. Yet, this particular AI translation could be further

modified by opting for the omission strategy, which involves removing the ST lexical units from the TT (Dickins et al. 2016), thus making it possible to avoid introducing unnecessary complexity or confusion. By omitting the technical expression "النفاذية" (or even the literal "شفافًا"), the message is simplified and kept accessible to a wider audience, especially those who might not be familiar with this particular technical jargon. In this case, the ST can be rendered into Arabic as استخدم أوعية مناسبة كان الوعاء آمناً للاستخدام في الميكروويف" "للطبخ في الميكروويف، ويمكنك بسهولة أن تختبر ما إذا. Here, the term "آمناً" (*āminan*), though it is more general than "نفاذية", conveys the intended meaning without resorting to technical terms and simplifies the instruction, focusing on the practical usability of the container for microwave cooking.

Besides its failure to provide accurate translations for words in their technical contexts, ChatGPT-4o's literal translation of other words offers a superficial representation of words due to overlooking the semantic features of the terms in the ST as the following example shows:

ST: "Eggs in their shell and whole hard-boiled eggs should not be heated in microwave ovens" (Molineux, n.d., p. 14).

AI translation: "تسخين البيض في قشره أو البيض المسلوق كاملًا في أفران الميكروويف" (OpenAI, 2024).

ChatGPT-4o chose the word "تسخين" to translate "heated", but this translation does not convey the intended meaning accurately. In the English example, "should not be heated" is intended to give instructions regarding "eggs in their shell" (not cooked eggs) and whole-hard boiled eggs (cooked eggs), which require two different ways of preparation. However, this is not explicitly stated in the ST since English, unlike Arabic, is a language that tends to integrate implicit meanings. Therefore, "should not be heated" takes into account the physical state of eggs. However, ChatGPT-4o's translation of the term as "تسخين" in both cases misses this feature of meaning that leads to an inaccurate translation. In Arabic, the word "تسخين" (*taskheen*) means to heat water or food or to make it hot (*Maajim Dictionary*, n.d.). This term directly translates to "heating" and is generally used when referring to reheating or warming food or leftovers that have already been cooked. Even though this lexical choice is appropriate when giving instructions about boiled eggs, it is not accurate for unboiled eggs, meaning that a more precise lexical equivalence should be used. One possible procedure that can work out the functionality of the ST is amplification. A human translator may amend the AI translation by using the Arabic "سلق" (*salq*) to better express the idea that unboiled eggs should not be prepared (cooked) in microwaves. By using this term, the TT holds the pragmatic function of informativity to show that it is unsafe to cook raw eggs in microwaves, which is functionally equivalent to the ST.

Another case of mistranslation appears in rendering the word "whole" to "كاملاً" (*kāmelan*), which is not fully understood in the TT. This is a term that has no direct equivalent in the TT as the process of boiling in Arabic is known to be for whole eggs. Keeping the word, therefore, creates a sense of confusion since readers may try to look for extra meanings, thus hindering the ultimate arrival at a full understandability that enhances usability. Hence, the presence and intervention of a human translator may be vital to rectify and revise the text by applying the omission procedure which, as Nida (1964) asserts, is helpful in excluding sources of confusion. Thus, a revised translation of the sentence above could be يجب عليك ألا تقوم بطهي البيض (غير المسلوق) أو تسخين البيض المسلوق في أفران الميكروويف". The revised human translation is sensitive to the context of language use. It adds clarity by addressing cooking and reheating separately, which transmits the intended function of the text by expressing its meanings precisely.

Translating Collocations and Hyponyms

In this section, the researchers investigate ChatGPT-4o's translations of collocations and lexical hierarchies. Collocations, which are pairs of words that frequently co-occur in languages (Carter, 1987), express specific meanings by drawing on the receivers' existing knowledge of the idiomatic meaning(s) of collocations. Lexical hierarchies, on the other hand, are important linguistic phenomena that avert redundancy. However, the speaker is supposed to figure out the different levels of meaning that these terms express, such as the difference between the hyponyms (specific terms) and hypernyms (general terms).

The findings of this study reveal that automated translations often fall short of handling English collocations and lexical hierarchies when rendered to Arabic, resulting in ambiguities or unnaturalness. In the context of ChatGPT-4o, AI turns insufficient in using these terms in a proper equivalent context, which leaves a direct negative impact on clarity and informativity. In the case of lexical hierarchies, ChatGPT-4o had a deficiency in addressing hyponyms and hypernyms effectively, which causes unjustified repetitions in Arabic that negatively affect the stylistic structure of the TT. As the example below show, with no further human amendments the translation lacks clarity which brings about a loss in the pragmatic function of persuasiveness:

ST: "Do not operate the appliance under a wall unit, shelf, or close to flammable materials such as blinds, curtains, drapes, etc." (Molineux, n.d., p. 12).

AI translation: "لا تشغل الجهاز تحت وحدة حائطية، أو رف، أو بالقرب من مواد قابلة للاشتعال مثل الستائر، أو الأغطية، أو غيرها." (OpenAI, 2024).

In the ST, a "wall unit" refers to a piece of furniture that is designed to be integrated into a wall. This phrase is a common collocation in the ST where the adjective "wall" modifies the noun "unit". When rendered into Arabic as "حائطية وحدة", the expression gains an awkward meaning and may not sound idiomatic for Arab readers since the word "وحدة", meaning unit (*wihdah*), does not typically combine with "حائطية" (the feminine adjective of "wall"). Native speakers of Arabic mostly use "وحدة" to describe things in a mathematical or organizational sense such as the use of وحدة مئوية or وحدة سياسية. This phrase is not employed in the sense that manifests the physical or material aspect of the object *per se*, which can be applied to the diction of furniture. Following Nida's notion of functional equivalence, such terms can be translated by explaining the functions of the referents in their particular context of use (Nida, 1964, p. 167). The formal equivalent for "wall unit" which is "وحدة حائطية" can be retained in the translation with some additional explanation to ensure clarity. Adding (قطعة مثبتة على الحائط) adjacent to "وحدة حائطية", as a result, preserves the same function of the ST and addresses the manual users of the TT through direct instructions.

ChatGPT-4o also fails to account for lexical relations and hierarchies in translation, which can result in redundancy in the TT. For example, "a wall unit" is a hypernym that encompasses "shelf", its hyponym. Hence, rendering the word "shelf" separately would be redundant. To address this issue, the translation needs to account for the entailment relationship between both expressions, such as لا تشغل الجهاز تحت وحدة حائطية (قطعة مثبتة على الحائط) كالرف العلوي أو الخزانة العلوية. The technical term "a wall unit" is used as a hypernym that includes "shelf" as part of its broader meaning. In this particular context, the word "shelf" functions as a hyponym, representing a more specific item within the general category of "wall unit".

The example above also shows that ChatGPT-4o struggles to handle distinct meanings in lexical sets in translation. The terms "blinds", "curtains", and "drapes" have nuanced differences in English, which can yet be similar and overlapping in meaning. Translating these lexical items directly and

literally into Arabic without articulating the different semantic features of each term creates redundancy and inaccuracy. In such cases, and to maintain functionality, Nida (1964, p. 236) poses that one possible solution is "translate a lower level term in the source language by a higher level term plus a qualifier, which tends to bring the more generic term down to the appropriately corresponding level". To avoid ambiguity, a more general expression can be used, such as "الستائر بمختلف أنواعها" (curtains of all types). Here, the phrase "بمختلف أنواعها" adjusts and generalizes the term by broadening the sense of term to include all elements included items. The final translation could be, in this sense, لا تشغل الجهاز تحت وحدة حائطية (قطعة مثبتة على الحائط) كالرف العلوي أو الخزانة العلوية أو بالقرب من مواد قابلة للاشتعال كالستائر بمختلف أنواعها.

Textual Level

The second aspect of translation assessment of ChatGPT-4o's translation of manuals investigates the produced texts at a discourse/textual level. Therefore, the analysis opts for the concept of textual equivalence, which is a sub-branch of functional equivalence (Cao, 2023, p. 44). At this level of analysis, the study examines textual phenomena such as cohesion and coherence, which are treated as basic principles of discourse that should be taken into high consideration to achieve an optimal functional equivalence at the level of discourse (Lu, 2001, p. 95).

Assessing Technical Issues of AI Discourse-Level Translation

As a means of communication, discourse embodies a number of principles including cohesion, coherence, intentionality, and acceptability (Lu, 2001, p. 95). Coherence and cohesion are critical aspects in the translation of instruction manuals as they preserve the effectiveness and accuracy of translated texts. Coherence is mainly established by effectively utilizing cohesive ties between sentences and expressing different cohesive devices between languages (Carroll, 2005). When rendering certain excerpts drawn from Molineux appliance manuals, originally written in English, to Arabic by depending on AI technology, it can be noted that ChatGPT-4o fails to account for these differences in cohesive devices between English and Arabic as it retains them in the same way they originally appear in the ST. This failure might lead to inaccuracies that confuse the users of the translated manuals.

In their analysis, the researchers note various recognized types of cohesion in the English texts, including reference, substitution, ellipsis, conjunction, and others (Ping, 2024, p. 169). In their discussion of the diverse employment of cohesion in both Arabic and English, Amer et al. suggest that while ellipsis commonly appears in English, Arabic relies commonly on repetition (2014, p. 9). However, ChatGPT-4o provides translations that tend to preserve these devices as they are originally presented in the ST without adhering to the linguistic norms of Arabic. Therefore, ChatGPT-4o's translations create less coherent technical texts and, subsequently, affect their clarity and naturalness.

In the following example, it is evident that ChatGPT-4o produces literal translations of the inserted excerpts from Molineux manuals, which result in an ambiguous use of pronouns. However, since these texts are intended to provide direct instructions, they should not require users to infer meanings and referents:

ST: "Liquids and other foods must not be heated in sealed containers since they are liable to explode" (Molineux, n.d., p. 14).

AI translation: "عليك ألا تُسخن السوائل أو الأطعمة الأخرى في أوعية مغلقة لأنها عرضة للإنفجار" (OpenAI, 2024).

The above example reveals a discourse-related issue that highlights a referential ambiguity. While pronouns are not complex in English as they usually have clear antecedents, the pronoun "they" in this example is ambiguous. It remains indefinite and imprecise whether it refers to "liquids and other foods" or "sealed containers". By looking closely into context, readers can tell that the pronoun refers to the containers; however, as mentioned earlier, clarity in user manuals should be achieved. The ChatGPT-4o-generated translation is literal; it does not consider the conventions of the target audience. In Arabic, referential pronouns contribute to discoursal coherence, but the use of the possessive pronoun "ها" in "لأنها" within the machine translation causes vagueness in anaphoric pronouns. This creates a potential misinterpretation of its antecedent. The pronoun "ها" could rationally refer to "الأوعية" (containers) or to "الأطعمة الأخرى" (other foods) since both are grammatically feminine and "ها" in this particular case is employed as a feminine marker.

AI literal translation of English ambiguous referent results in Arabic ambiguous referents, if we take into account Nida's proposition that "avoiding repetition often leads to ambiguity, not only in a receptor language, but also in the source language" (1964, p. 212). To Nida, therefore, transferring certain references from the source language to the receptor language requires adding elements that clarify these references to participants (Nida, 1964, p. 231). The Arabic style of writing mostly prioritizes repetition over pronouns, especially in technical writing. Accordingly, the translation can be modified to be عليك ألا تُسخن السوائل أو الأطعمة الأخرى في أوعية مغلقة لأن هذه الأوعية قد تتعرض للانفجار. The word "الأوعية" (containers) is repeated with the demonstrative pronoun "these" to make the TT referentially clear. Hence, the translation does not require the audience to exert unnecessary effort to infer referents, which is important to achieve precision and leave no room for ambiguity.

Other discourse-related aspects, especially those concerning the use of punctuation, are important when translating appliance manuals as they participate in building cohesion and coherence. Arabic and English employ punctuation differently and disproportionately; therefore, adaptation of the variant usage is key to attain clarity in the target language. In the example below, ChatGPT-4o retains the SL punctuation, instead of adhering to the TL conventions. This technology-driven approach to translation may lead to non-standard or unconventional language usage, and it potentially confuses the users due to this inaccurate or incompatible translation in which the cohesive devices in Arabic are disregarded.

ST: "Attempt to fry food – it is impossible to control the temperature of the oil and other fats – fire-risk" (Molineux, n.d., p. 14).

AI translation: يجب عليك ألا تحاول قلي الطعام – من المستحيل التحكم في درجة حرارة الزيت أو الدهون الأخرى – خطر الحريق (OpenAI, 2024).

In the ST, a dash is employed to show a cause-effect relationship. In other words, the fact that it is impossible to control the temperature of the oil and other fats is the reason why users must not attempt to fry food in microwaves. The problem that is transferred to the translated Arabic text lies in retaining the dash between the two parts of this text. This rendition seems unidiomatic, and the resultant structure could confuse readers, particularly with the abrupt transition between ideas. In fact, Arabic relies on conjunctions, rather than punctuation, to achieve cohesion that is important to ensure textual coherence.

Nida (1964) proposes that the dynamic correspondences require that not all linguistic items presented in one language need to be replicated in another language (p. 224). Accordingly, to improve this translation, it is important to replace the dash with a conjunction such as "لأنَّ", which literary means *because* in Arabic (*lianna*). This replacement functions as a justification of the reason why

frying food may become unsafe. This change improves the sentence flow by directly clarifying the cause-effect relationship, thus creating a more logical and comprehensible structure. However, the second dash can be retained before "خطر الحريق" to emphasize the warning of the fire risk, drawing the reader's attention to the serious consequences of attempting to fry food. Thus, this translation can be rendered as"يجب عليك ألا تحاول قلي الطعام لأنه من المستحيل التحكم في الزيوت أو الدهون الأخرى—خطر الحريق", which is more fluid and natural in Arabic. This translation offers a logical progression of ideas in the ST: the instruction not to fry food, followed by the explanation, and then the emphasized warning, which is a sequence that is more appropriate for translating instruction manuals.

CONCLUSION

This study examines the efficiency of ChatGPT-4o, one of AI tools, in translating appliance instruction manuals from English into Arabic. By analyzing translations of some manuals produced by Molineux Company, specifically microwaves, ovens, and irons, the researchers identify and categorize the mistakes and linguistic inaccuracies made by ChatGPT-4o. The primary focus is to recognize the most obvious mistakes at the lexical and textual. It is assumed that due to the precise nature of technical texts, any inaccurate choices at these two levels hinder the pragmatic functions of the texts, especially informativity and persuasiveness.

By adopting Nida's concept of functional equivalence, and by employing a systematic linguistic (semantic and pragmatic) examination of the language choices, the study reveals a number of issues related to ChatGPT-4o's translation of technical or instructive texts. At the lexical level, AI tools display a tendency to produce overly literal translations, often failing to capture the specialized terminology of appliance manuals. This results in translationese, which makes it challenging for Arabic-speaking users to grasp the instructions properly. In some instances, word choices, collocations and hyponymy are rendered in ways that deviate from standard Arabic usage, thus affecting the clarity and accuracy of the message. At the textual level, aspects of cohesion and coherence are frequently disrupted in ChatGPT-4o's translations. These problems become particularly critical in instruction manuals, where clarity of information is essential to user comprehension. To address these issues, human translations are proposed to modify and complement the final product of TTs in order to make them appropriate for the target audience. The alternative translations include techniques such as omission, addition, lexical and textual equivalences to achieve the functionality of the appliance manuals.

Ultimately, the findings of this study suggest that AI is not fully capable of translating technical texts in a functional manner that is appropriate for TT consumers, especially between languages of different textual conventions. AI's inability to fully grasp the nuanced semantic features of some linguistic items and its failure to adhere to the textual-level norms of writing underscore the importance of human direct involvement in translation. Therefore, the study recommends a hybrid approach that combines both AI technology and human expertise to achieve a high-quality translation, ensuring both necessary clarity and vital accuracy.

Disclosure Statement

- **Ethical Approval and Consent to Participate:** The study is based on publicly available data and did not involve direct human participation; hence, ethical approval and informed consent were not applicable.

- **Availability of Data and Materials:** The data used in this study are publicly available appliance instruction manuals obtained from the official website of Moulinex. Translated outputs generated by ChatGPT-4o can be shared by the authors upon reasonable request.
- **Author Contributions:** Dr. Mohammed Hamdan led the conceptualization of the study, supervised the research process, and contributed significantly to the analysis and writing of the manuscript. Dr. Rami Qawariq assisted in refining the methodological framework, supported the analytical process, and reviewed the final draft. Mayada Arabasi contributed to the collection and classification of textual data and participated in drafting portions of the analysis. Dima Snober assisted in data analysis and was involved in editing and revising the manuscript. All authors read and approved the final version of the article.
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