Linguistics at the Service of Machine Translation: Modality as an Example

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Abstract

Disagreement between linguists and translation theorists has been incessant as linguists consider linguistics as an essential part in the translation process while translation theorists consider translation as a discipline that stands by itself with its own strategies and theories. However, though this dispute isn't recent, no one has tried to show how linguistic topics can serve in the understanding of a sentence and how should the tagging process be for Machine Translation (MT). This paper highlights the long clash between linguists and translation theorists, the history of machine Translation, the definition of modality, the types of modality, the factors that affect the meaning of a certain modal in a sentence, and the tagging of modals to best use them in machine translation. It also attempts

to show how linguistics is at the service of MT if it is well exploited according to the linguistic epistemic tagging mainly the tagging of modals and the adjacent parts of speech in order to give correct translation when using MT.

Qualitative research is conducted through comparing a set of bilingual English-Arabic samples from the UNDP documents in order to come up with rules that fortify the abovementioned assumption. As a conclusion, the researcher shows that modalized translation doesn't work with modals because Arabic doesn't have a defined modal system and the meaning varies from one sentence to another based upon the speaker or writer's opinion or attitude unless taking into consideration the surrounding factors of modals. The comparative analysis will be adopted to show the way the parts of a language function when expressing ideas in other languages (Moindjie, 2015).

Keywords: Machine Translation, Modals, Tagging, Epistemic.

Literature Review

Linguists vs. Translation Theorists

The relationship between linguistics and translation theories remained uncertain and tension didn't stop but remained where the German theorist Jorn Albrecht expressed, eight years after the declarations of Chomsky and Catford, his regret and astonishment that linguists hadn't studied translation. Moreover, the linguist Aleksander

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Shveister said that many linguists decided that translation could be the object of linguistic study. Maurice Pergnier, in turn, said that linguistics improved in ways that made it more relevant to the concerns of translation. The Canadian translation theorist Jean Delisle said that the langue-oriented approach that produces useful comparative descriptions of language systems should be part of the knowledge of each translator where he said that he couldn't imagine a translator without the basic knowledge of the languages they master (Fawcett, 2003).

On the other hand, thirty years after Catford and chomsky's declarations, Roger Bell said that translation theorists and linguists had their own separate ways, and Marianne Lederer was one of those who dismissed linguistics from the translation studies where she said that she hoped to bring out the reasons why translation must be dealt with on a different level with linguistics (Fawcett, 2003).
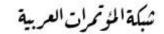
In this study, we will show that linguists have a lot to give to translation and the tagging phase of Machine Translation through applying the findings of linguistics on translation.

Definition of Machine Translation

According to Trujillo (1999), MT is the application of computational techniques to aid in the translation of texts. MT can master the "mapping" of the grammatical structures of the source and target languages. This is easy

for MT systems, especially when the grammatical structures of both languages are similar. In case of different structures, the target sentence and word order should be restructured to guarantee the correct meaning.
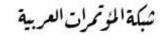
History of Machine Translation

The origins of machine translation (MT) may be traced back to the seventeenth century but the twentieth century has witnessed the first practical suggestions as two patents were issued in 1933 by the French Georges Artsrouni and Russian Petr Trojanskij. (Hutchins, 2001; Melby & Warner, 1995).

However, the next MT development attempt was made in March 1947 by Andrew Booth and Warren Weaver who haven't had any knowledge about these precursors when they met in March 1947 and put forward the first tentative ideas for using the newly invented computers for translating natural languages (Hutchins, 2001).

The history of Machine Translation has been affected by the politics, science and economics (Trujillo, 1999). This issue is well shown in the successful employment of computers for deciphering encryption methods during the Second World War (Trujillo, 1999; Melby & Warner, 1995).

In May 1951, Bar-Hillel was appointed to carry out research at the Massachusetts Institute of Technology (MIT) where he convened, in June 1952, the first MT conference at MIT in collaboration with International Business Machines Corporation (IBM) (Hardmeier, 2014).
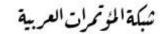
On the other hand, a memo by Warren Weaver to put specific strategies for using computers to translate natural languages initiated MT research in the USA and in the rest of the world, with the first public demonstration of a Russian-English prototype MT system in 1954 (Trujillo, 1999). This event led to similar work in the then USSR and other places around the world.

However, enthusiasm faded after the publication of "Bar-Hillel Report" and "the ALPAC Report" which stated that the expectations of MT goals are excessive and unrealistic compared to the poor actual progress (Khalilov, 2009).

Accordingly, research in the field of MT was restricted from the 1950s to the early 1980s (Khalilov, 2009) despite the usage of Systran by many intergovernmental institutions like NATO, the International Atomic Energy Authority, and many companies like General Motors of Canada, Dornier, and Aerospatiale.

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After a period of recession, the early 1980s witnessed an increase interest in MT such as "Logos" and "Metal" (Khalilov, 2009) in addition to some commercial systems that began to appear (Trujillo, 1999).

From the mid-1980s, less expensive MT systems began to appear as a result of microcomputers prices reduction, the wide availability of text processing tools and a resurrected interest in MT technology from commercial organizations. Nearly all MT research activities at time focused on finding methods for linguistic analysis aimed at expanding an MT system based on traditional rule-based transfer and interlingua approaches. (Khalilov, 2009).

In 1985, another MT system came up from the research conducted at the University of Texas, namely METAL (Mechanical Translation and Analysis of Languages). After METAL attempted Interlingua experiments, it essentially adopted a transfer approach (Khalilov, 2009).

MT bounced back in the 1990s when the first Statistical Machine Translation (SMT) systems were developed due to the result of progress made in computer technology and software engineering in the previous few years (Khalilov, 2009) and a number of companies, particularly Japanese electronics manufacturers, began

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to market MT software for workstations until reaching by the late of 1990s an increased interest in Example-Based MT (Trujillo, 1999).

In the 2000s, the NIST Open Machine Translation (MT) evaluation series commenced in USA; and the Google research team has developed Google-Translate, which operates as free online service for many language pairs including Arabic. In parallel, many MT projects have been initiated in Europe like EuroMatrix and METIS-II, according to the Technische Universitat Dresden.

Nowadays, the statistical approach limited to bilingual lexical examples extracted from parallel training data regardless the existence of many purely statistical and hybrid translation systems with greater powers of generalization the general trend in MT drives toward the generalization of morphologic, syntactic and semantic abstractions that operate within a statistical translation system and complement fundamental models (Khalilov, 2009).

Strategies for Machine Translation

When talking about MT, researchers deal with the hereunder strategies but no one has, to my knowledge, discussed the tagging that is one of the phases in the automated translation process.

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Direct: Direct systems require string pattern matching, with some rearrangement in the Target Language word order without performing any linguistic analysis at all (Khalilov, 2009). This strategy was widely used in early systems and personal computers employ (Trujillo, 1999).

Transfer systems: Transfer systems include the analysis of the source input into a transfer structure that doesn't consider the grammatical details of the Source Language. After analysis, the Source Language is transferred into a corresponding Target Language structure which is later on used to generate a Target Language sentence (Trujillo, 1999).

Interlingua: The Interlingua approach passes through two stages: first, the source language sentence is analyzed into an Interlingua representation i.e. translation is considered a mapping between the semantic spaces of a particular word in the source and target languages (Khalilov, 2009); then, the target text converts the meaning of that representation into an output sentence (Alqudsi, Omar & Shaker, 2012).

Arabic Machine Translation

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Although Arabic is one of the major languages on which experimentation in MT was made in the early days of MT and specifically in the US, the first English to Arabic machine translation system was released in the early eighties (Farghali, 2010).

Apart individual work like the Machine Translation designed by Nazlia Omar and "Sakr Software" company - a branch of al-Alamiah Group, there has been no serious work on the development of software packages of machine translation or other applications of natural language processing for Arabic (Zughoul &Abu Al-Shaar, 2005).
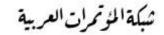
Other Arabic Machine Translation like Systran, Google, Al-mutarjim Al-arabey aren't designed by Arab companies but by western countries due to the importance of Arabic to globalization, developments in information technology, commerce, and business (Zughoul &Abu Al-Shaar, 2005).

Approaches for Arabic Machine Translation

Arabic has peculiarities: it is rich with suffixes and prefixes; Its inflectional and derivational productions introduce a big growth in the number of possible word forms. In this language, articles, prepositions, pronouns, etc. can be affixed to adjectives, nouns, verbs and particles to which they are related. Moreover, Arabic has a relatively free word order, this poses another significant challenge to MT due to the vast possibilities to express the same

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sentence in Arabic. Therefore, Morphological and syntactic preprocessing is important in order to converge from and into Arabic (Zughoul &Abu Al-Shaar, 2005).

Guidere mentions two approaches for AMT: The first approach is the "particularistic" which delineate the linguistic idiosyncrasies of Arabic and use them for a local processing approach specific to the internal linguistic system of Arabic. The other approach which is regarded as complementary to the "particularist" approach is called the "universalist", an approach already followed by most of the companies producing software application for Arabic, which explores possibilities of applications of methods already tested on other languages without adaptation.

The abovementioned parts show that researchers have elaborated on the approaches of MT and Arabic Machine Translation without mentioning the tagging process. This issue might be as a result of the clash between linguists and translation theorists.

Tagging

Tags are the arbitrary words uploaded by users to retrieve specific resources (Dellschaft, 2008). Tags that are used for retrieving specific resources from the system (Dellschaft, 2008) play a basic role in the automated

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translation because the errors in the tagged corpora hamper the research progress, and tagged corpora include errors which impede the progress of research (Murata, Utiyama, Uchimoto, Ma, and Isahara, 2001)

To my knowledge, the parts of speech tagging adopted nowadays for all MT is not carried by translators that's why the tagging focuses on the grammatical category without taking into consideration the factors that are of necessity for translation because the difficult problems that are faced are the tense, aspect, and modality in Machine Translation (Murata et al., 2001); in other words, the word shouldn't be tagged without knowing the elements that surround it.

The failure of the heuristic rules used for tagging led to the application of the corpus-based approach such as the example-base method, which is the method used in this paper because the POS meaning differs from sentence to another; for example, the word book can be considered a noun or a verb and we need to study the adjacent elements in order to get the suitable tagging.

To conclude, in a sentence, many factors must be taken into consideration before launching the tagging process like the tense, mood, and aspect because when tagging a sentence, we don't tag each POS alone without taking the surrounding elements; for example, if it is a noun phrase, verb ellipsis, interjection or greeting sentences are taken as

one POS. We take all these factors into consideration because if the correct category is estimated, it should be translated into another language. Therefore, the tagging is manual as it must be though being time consuming. (Murata et al., 2001)

Definition of Modality

Modality is a semantic grammatical stylistic aspect used to achieve the purpose of an utterance (Moindjie, 2015). According to Halliday, modality is an expression given to a type of meaning that reflects the speaker's intention, judgment or perspective. Palmer (1990) likewise defines modality as the way to convey the speaker's opinions and attitudes. Palmer adds that modality is a cross-language grammatical category that is subject to typological study (Abdel Fattah, 2005).

Vinay and Darbelnet say that modality role is to reflect the speaker's stance according to whether it is considered a fact, a belief, a necessity, etc... they add that every language has its expressive ways in using this aspect. For Carter, Goddard, Reah, Sanger, and Bowring modality deals with the "relationship between the writer and reader of the text (Moindjie, 2015).

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The concept of modality is vague and not common in all languages to the extent that it may vary within the given language as there might be uncertainties according to the approach: syntactic, pragmatic, semantic, etc… For instance, modality is the modal auxiliary in English while it is composed of the verbs, particles and prepositions in English (Abdel Fattah, 2005). Accordingly, it is not easy to determine the meaning of modality relying on a single perspective. In other words, the elements surrounding the modal should be examined in order to get the correct translation of the modal.

Types of Modality

Palmer (2001) classifies modality into two categories:

1. Typological modality, directives or Event Modality that are permissive, commissive, and obligative that are the most common type like may, can, and must ,*have to*, and the past tense forms: *ought to*, *should*, *might*, and *could* (Abdel Fattah, 2005; Moindjie, 2015) and can be of two subcategories: deontic (refers to actions that haven't taken place yet but can take place in the future) and dynamic; and

2. Propositional Modality that can be of two subcategories: epistemic and evidential Abdel Fattah, 2005).

The definition and types of modality are given to justify the process of tagging in the methodology.

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Methodology

This research is exploratory in nature based on qualitative method that provides the reader with rich and detailed results and offers ideas and concepts (Centre for Local Economic Strategies [CLES]). Primary and secondary data are required in the current research. Secondary data has been used in the literature review to provide the theoretical and historical grounding concerning Machine Translation. Primary data is collected directly from random economic and educational documents from UNDP. Modals are selected from these documents and then classified according to their categories, subcategories and epistemic tagging of the surrounding elements. These documents were used as the instrument of research through comparing the English and Arabic versions.

The researcher believes that modals can have accurate automated translation if their tagging is based on grammatical syntactic rules and regulations.

Data Analysis

Translation of modals is a process that should be approached with fine discrimination due do the delicacy of meaning they convey (Abdel Fattah, 2005). There are many factors that affect the translation of the modal: its

category, subcategory, surrounding elements i.e. verb, subject, preposition, object, etc…, and semantic indeterminacy i.e. ambiguity (where more than one interpretation is possible) (Murata et al., 2001). Accordingly, translation of modals requires decontextualisation, a textual re-organization, and an accounting for intertextual coherence together with its cultural aspects. The traditional usually known dichotomy between source language and target language orientation does not apply to modal translation (See Table 1) because the general meaning expressed by modals is governed by cognitive processes controlled by: Text-type conventions, Text dynamics (information in the text and audience prior knowledge), and Interpersonal factor (relationship between the writer and the reader) (Abdel Fattah, 2005)

The failure of modals translation is due to the pure linguistic meaning of an utterance with no reference to the context. To best know the meaning of a modal, the tense, aspect intentionality and other extralinguistic factors should be studied to decrease the degree of indeterminacy (Abdel Fattah, 2005)

If the following example is used "You must leave now", it reflects an obligation if the speaker is in higher position; let's suppose an employee in the office of the boss and tells him that the company should deliver an order within 10 minutes, so the usage of "must" shows an obligation; therefore, we should use in Arabic a word that

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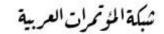
shows an obligation but in a respectful way in order not to embarrass the employee like "يتعيّن عليك الذهاب الآن". However, It is considered an advice if the speaker is in the same position; for example, if it is 8:00 o'clock and friend A is telling friend B that the train leaves in 10 minutes and is asking whether he can reach the station; so the reply should be "you must leave now" as it is implicitly an advice that friend A should leave now if they intend arriving on time and not to miss the train; therefore, any word can be used in Arabic like "عليك الذهاب" or " يجب أن تذهب" because there are no formalities.

As noticed from the abovementioned example, there might be several interpretations for the one sentence that might affect its translation but one answer is found when using MT because it occurs without any human interference, so the analysis of the surrounding factors should be taken into consideration (Abdel Fattah, 2005). In addition to the semantic approach, the modal is also affected by the syntactic elements because the translation, for example, changes with the change of the subject pronoun (Abdel Fattah, 2005).

As a conclusion, the linguistic and extralinguistic factors like pragmatics, semantics, grammar, and stylistics influence the process of translation of modals that have subtle social and cultural connotations that the translator doesn't know (Abdel Fattah, 2005).

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1. Tagging of Modality

The tagging should vary from language to another because every language has its peculiarities. For instance, the semantic-grammatical analysis of modals has been the most successful way for English while it should be inherently different in Arabic; it should be epistemic as will be shown later on. So, trying to translate modals from a SL to a TL without considering all the factors that render perfect is useless and inadequate (Abdel Fattah, 2005).

First of all, the work should be carried out on the translation of modal that should not be free but should have contextual bound and then on its tagging. To translate a modal, the translator should first know the category of the modal (epistemic or non-epistemic) then rephrase the modal (Abdel Fattah, 2005) but the surrounding factors in addition to the tense, aspect, and modality even inside the one category should be studied (Murata et al., 2001) because modality deals with the relationships among the three fundamental elements of a sentence, which are subject, predicator, and complement in order to tag a modal (Moindjie, 2015).

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Meanings	English	Arabic	Meanings	English	Arabic*
Conclusion	Must	لا بد	Obligation	Must	يجب/على
			Necessity	Have to	يتعين
			Duty	Should	ينبغي
			Duty	Ought to	ينبغي
Conclusion	May	أمكن	Permission	May	قدر/سمح
Conclusion	Can	أمكن	Permission	Can	استطاع/وسع

Table 1 (Abdel Fattah, 2005)

Accordingly, after sorting out the text in terms of mood and aspect, the modal should be tagged as follow: category/ subcategory/ meaning/ element that precedes/ element that follows/ tense/ exceptions, if any, of the sentence.

3. Arabic and Modality

Arabic has peculiarities and the main particularity of Arabic when translating modals from or into Arabic is that Arabic doesn't contain a defined modal system but it is mostly lexical; therefore, any word which expresses a modal

meaning can be part of the system regardless of its grammatical category. On the other hand, there are other problems like contextuality, ambiguity, and indeterminacy that are associated with the possibility of mistranslations (Abdel Fattah, 2005). Moreover, the absence of Arabic linguistic corpora will lead to failing in reaching a monolithic system of modality (Abdel Fattah, 2005).

Some modals have perfect alternative in Arabic like "must" but others should be contextualized and uses many expressions deontically such as verbs like: تعين، انبغى، احتمل، تحتم ;وجب، لزم، جاز، قدر، وسع، سمح derived verb stems like من الواجب، من المفروض، من الممكن، من اللازم، من المتعين، من الجائز and modal phrases على; particles أفترض، استطاع، أمكن، تمكن; باستطاعتك، بإمكانك، بوسعك، بمقدورك (Abdel Fattah, 2005); and there is a tendency to use imperatives when it is a question of deontic meaning which is inherently weak in Arabic, and it seems that most Arabic modals tend to be dynamic or epistemic (Abdel Fattah, 2005). However, ambiguous modals should be reduced if the background of utterances is known through contextualization and rephrasing (Abdel Fattah, 2005). The hereunder table reflects samples taken from the UNDP documents and shows the epistemic tagging of modals to get correct translations.

Modal	English	Arabic	Tagging for Rules	Translation of Modal

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Should	While It should be centered	فيما من المفترض أن تتمحور	Impersonal pronoun "it"+ deontic modal of duty "should"+ base form of the verb to be "be"+ past participle of a verb that doesn't mean mentioning	من المفترض أن
	Finally, it should be noted that in both years 2014 and 2015, Lebanon accounted over 1 million registered displaced persons, which constituted around 25 per cent of the Lebanese population and represented the world's	كما تجدر الإشارة أنّ عدد النازحين السوريين المسجلين في لبنان في العامين 2014 و2015 قد تعدّى مليون نازح ما يشكّل حوالي 25% من سكان لبنان، وهو يعتبر أكبر عدد من النازحين لكل فرد من سكان أي بلد في	Impersonal pronoun "it"+ deontic modal of duty "should"+ base form of the verb to be "be"+ + past participle of a verb that means mentioning	تجدر الإشارة

	highest number of refugees per inhabitant.	العالم.		
	We **should** look at Syrian refugees from a humanitarian perspective.	**علينا أن** ننظر إلى اللاجئين السوريين من منظور إنساني.	Plural pronoun that reflects the speaker+ modal of duty "should"+ base form of a verb of action	علينا
	I understood that **I should have** a different perspective on this issue and should not blame anyone nor throw any prejudice.	فهمت أنه **عليّ** تغيير وجهة نظري وعدم لوم أحد أو التحيّز ضدّه	Singular pronoun that reflects the speaker+ modal of duty "should" + base form of a verb	عليّ
	We should all fight against	علينا جميعا محاربة العنف	Plural pronoun that	علينا

	violence especially in schools.	وبخاصة في المدارس.	reflects the speaker+ modal of duty "should"+ plural pronoun "all"+ base form of a verb of action	
Can be	Changes and stabilized conditions in 2015 compared to the situation in 2014 can be summarized as follows.	يمكن تلخيص التغيرات والأوضاع المستقرة في عام 2015 مقارنة بالوضع في عام 2014 على النحو التالي	Permissive deontic modal "Can"+ base form of the verb to be "be"+ past participle of a verb	يمكن
	As indicated in the EASC of 2014, the potential environmental stressors of ITSs on agricultural areas and	استنادا إلى ما هو مبين في تقييم الأثر البيئي للأزمة السورية لعام 2014، يمكن تلخيص الضغوطات البيئية	Rule of the given example: Noun, inanimate, plural,	

	environmentally sensitive areas can be summarized by the following.	المحتملة للمخيمات غير الرسمية على المناطق الزراعية والمناطق الحساسة بيئيا كما يلي	countable+ conjunction of addition "and"+ past participle of a verb that has the function of adjective+ Noun, inanimate, plural, countable+ preposition "in"+ year+ compared to+ definite determiner "the"+ noun, countable, inanimate, singular+ preposition "in"+ year+ compared to+ Permissive
	The impacts of the incremental quantity of Municipal Solid Waste can be summarized as follows.	يمكن تلخيص الآثار المترتبة على الكمية الإضافية من النفايات البلدية الصلبة على النحو التالي.	

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			deontic modal "Can"+ base form of the verb to be "be"+ past participle of a verb…	
Can	Only the people **can guarantee** the sustainability of social stability.	الشعب وحده **يضمن** استدامة الاستقرار الاجتماعي.	Adverb "Only"+ definite determiner "the"+ noun, countable, animate, plural+ Permissive deontic modal "Can"+ guarantee + definite determiner "the"+ noun, inanimate, uncountable, singular+ of+ adjective+ noun,	The modal is omitted and is replaced by the meaning of the verb "guarantee" يضمن

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		uncountable, inanimate, singular	
Yet, Tripoli was one of the few regions where violent conflicts persisted, more or less intensely, until 2014; in particular in two adjacent areas, Bab el-Tabbaneh and Jabal Mohsen, where the conflict **can** still erupt again any time.	إلا أن طرابلس تبقى من المناطق القليلة التي استمرت فيها الاشتباكات العنيفة، المستشرية أحيانا، حتى العام 2014، ولا سيما في منطقتين محاذيتين هما باب التبانة وجبل محسن حيث تبقى **إمكانية** نشوب صراع جديد مفتوحة في أي وقت	Definite article+ conflict+ modal can+ still+ erupt+ word that shows repetition: تبقى إمكانية نشوب صراع جديد مفتوحة	
If media **can** fuel conflicts, media **can** also build peace.	إذا كان **بإمكان** وسائل الاعلام تأجيج النزاعات،	Uncountable noun, inanimate, concept+	

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	English	Arabic	Structure	
		فـ**بإمكانها** إذا بناء السلام أيضا.	can: (أو أي فعل مشتقّ من مكَّن)+ الاسم غير المعدود غير العاقل المفهوم	
	National media, when used in a conflict-sensitive and object-manner, **can** play a vital role in de-escalating conflict and building peace.	**يمكن** لوسائل الإعلام الوطنية، حينما يتم استخدامها بطريقة موضوعية وتراعي ظروف النزاع، أن تلعب دورا حيويا في الحد من حدة الصراع وبناء السلام	فعل مشتقّ من مكَّن + الاسم غير المعدود غير العاقل المفهوم	
Can we/ we can	How **can we** conduct the influencing power of the religious media to serve civil peace?	كيف **يمكننا** توجيه سلطة وسائل الاعلام الدينية المؤثرة لخدمة السلم الأهلي؟	Wh question word+ permissive deontic modal "can"+ Pronoun, plural, reflects the speaker	يمكننا

			"we" + base form of a verb of action	
	To what extent **can we** use religious media content to ease the situation of Syrian refugees in Lebanon?	إلى أي مدى **يمكننا** استخدام محتوى وسائل الاعلام الدينية للتخفيف من حدّة وضع اللاجئين السوريين في لبنان؟		
	We can now keep with techniques, theories and technology of today.	**يمكننا** الآن مواكبة التقنيات والنظريات والتكنولوجيا المتّبعة اليوم.	Pronoun, plural, reflects the speaker "we"+ permissive deontic modal "can"	**يمكننا**
May	While some **may** suffer from lack of basic services.	في حين **قد** يعاني البعض نقصا في الخدمات الأساسية.	Conjunction "while"+ pronoun that reflects an amount "some"+	قد

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			deontic modal of permission "May"+ base form of a verb	
Must	Diversity enriches our communities; we **must** use it as an asset for our development	التنوّع يُثري مجتمعاتنا؛ لذلك **يجب** أن نستغلّه في تطوير أنفسنا.	Pronoun, plural, reflects the speaker+ deontic obligative modal "must"+ verb of action/ base form+ impersonal pronoun, singular, reflects an object	يجب
Might have	All the barriers of sharing intimate and personal stories that **might have** a traumatic background have been	من خلال هذا التمرين، تم تكسير كافة الحواجز التي تقف بوجه مشاركة القصص الحميمة والشخصية والتي **قد**	Plural pronoun "all"+ definite determiner "the"+ noun, inanimate, plural,	قد تكون/قد يكون (based on the tagging of Arabic) because

	shattered through this practice.	..**تكون** ذات خلفية مؤلمة	countable+ of+ gerund+ adjective+ conjunction of addition "and"+ adjective+ noun, plural, inanimate, countable+ Might have+ indefinite article	as previously mentioning, each language has its own tagsets

Examples in rows 2 & 3 are adopted from the UNDP documents.

Results

The adoption of the epistemic tagging of modals based on linguistics leads to the following outcomes:

- If there are an impersonal pronoun "it", deontic modal of duty "should", base form of the verb to be "be", and past participle of a verb that doesn't mean mentioning, the translation of the modal is من المفترض أن

- If there are an impersonal pronoun "it", deontic modal of duty "should", base form of the verb to be "be", and past participle of a verb that means mentioning, the translation of should becomes تجدر الإشارة

- If there are Plural pronoun that reflects the speaker, modal of duty "should", and base form of a verb of action, the translation becomes علينا

- If there are permissive deontic modal "Can", base form of the verb to be "be", and past participle of a verb, the translation becomes يمكن

- If there are the adverb "Only"; definite determiner "the"; noun, countable, animate, plural; Permissive deontic modal "Can"; guarantee; definite determiner "the"; noun, inanimate, uncountable, singular; of; adjective; uncountable, inanimate, singular, noun, the modal is omitted and is replaced by the meaning of the verb "guarantee" يضمن

- If there are wh-question word; permissive deontic modal "can"; Pronoun, plural, reflects the speaker "we"; base form of a verb of action, the translation becomes يمكننا

- If there are the pronoun, plural, reflects the speaker "we"; permissive deontic modal "can", the translation becomes يمكننا

- If there are the conjunction "while"; pronoun that reflects an amount "some"; deontic modal of permission "May"; base form of a verb, the translation becomes قد

- If there are the pronoun, plural, reflects the speaker; deontic obligative modal "must"; verb of action/ base form; impersonal pronoun, singular, reflects an object, the translation becomes يجب

- If there are the plural pronoun "all"; definite determiner "the"; noun, inanimate, plural, countable; of; gerund; adjective; conjunction of addition "and"; adjective; noun, plural, inanimate, countable; Might have; indefinite article, the translation becomes قد تكون/قد يكون based on the tagging of Arabic because each language has its own tagsets as previously mentioning.
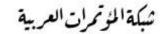
Recommendations

The researcher agrees with the following to recommendations whenever parts of speech are tagged for machine translation.

1. Based upon the aforementioned, it is recommended to go with Murata et al. (2001) regarding the uncommon tagging system for all languages; each language should have the tagging that suits its peculiarities for example when translating from Japanese to English, the verb phrase is tagged Vj while it is usually tagged with V because the words don't maintain the same sequence when being translated from one

language to another as shown in the abovementioned examples and as stated by Saussure that language is a set of structured systems that are systematic (Fawcett, 2003) and give structural equivalences (Andriamanankasina, Araki, & Tochinai, 1999).

2. The tagging process should not be automated and should be carried out by people who have long experience and the intuition and reasoning of translation (Moindjie, 2015).

Conclusion

Modals can have accurate translation in Machine Translation provided taking into consideration the surrounding parts of speech and doing the tagging process epistemologically departing from the syntactic classification and the translational intuition. Moreover, the tagging process should be manual and different from one language to another.

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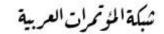
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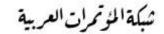
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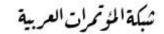
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