Thematic Analysis in Translating English and Arabic Scientific Texts

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Thematic Analysis in Translating English and Arabic Scientific Texts

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ABSTRACT

The thematic and information structure of scientific and technical texts are arguably different among languages. This study examines the thematic structure of scientific texts in English and Arabic to see the differences in the hierarchical organization at different thematic levels. It adopts Halliday's functional model of theme-rheme and applies it to English and Arabic scientific texts. The paper mainly investigates the three levels of theme: textual, interpersonal and experiential with the intention of discussing their translations into Arabic. It uses a corpus data of two scientific texts. The syntactic and textual elements of those texts were compared and contrasted and professional translations were provided to study the Arabic thematic structure. The data provides English and Arabic versions which allow for a comparable analysis of structure, convention and style. The study reveals that the most frequent type of themes and thematic progression is the experiential theme. It shows that those experiential themes are almost always occupying initial positions. The structure of themes has the tendency to be reproduced in the translation. However, the findings of this investigation indicate that position of themes may change as a result of translation, or changed from experiential into textual.

INTRODUCTION

Each language contains linguistic characteristics which distinguish it from other languages, be it lexis, syntax, structure, style, or written norms and conventions. In translation, especially technical or scientific translation, it is important to produce texts that adhere to the target text conventions and avoid interference as much as possible. Javier (2009) defines interference as "the importation into the target text of lexical, syntactic, cultural or structural items typical of a different semiotic system and unusual or non-existent in the target context" (p. 75). It is true that all languages differ to a certain degree, but they also share some similarities. However, in order to find out the differences and similarities between Arabic and English in terms of thematic structure, this study highlights the conventions and norms of scientific texts in English and Arabic.

The thematic progression of texts has been the subject of a number of studies (Carter-Thomas, 1999; Paltridge, 2006; Sade, 2007). This is because the flow of information in texts has always been the primarily focus for writers, readers and thus translators. According to Halliday & Matthiessen (2004), the theme is "the starting point for the message" (p. 64). It occupies initial positions in sentences and carriers known information. The rheme, on the other hand, comes after the theme and provides new information. It is "the part of the clause in which the theme is developed" (Eggins, 2004, p. 300). The theme/rheme structure plays a major role in text organization as it helps in facilitating comprehension of the message. The thematic structure of a text determines it is level of coherence. The choice of themes, as they offer the given information, will influence the rhematic part which offers the new information for readers. This rhematic element can be the thematic element on the following sentence. Such progression of theme/rheme ensures cohesive development of texts by employing cohesive devices (Eggins 2004). These devices have the function of connecting sentences and paragraphs of the text.

Nida (1997) asserts that translators have to equip themselves with the structure of discourse of both languages in order to be able to accurately reach the final translation products. Accuracy is the focus of scientific text translation (Roger, 2007). Thus, the research problem of this study is that although scientific texts translation has always been revolving around accuracy and consistency of information, this has not been given enough space of research in Arabic translation of scientific texts that focusing on thematic structure.

This is not only related to the syntactic structure but also the structure of information in a text (Enkvist, 1978). The

construction of information is centred on the thematic structure. Thus, the aims of this study are as follows:

1. To analyze the thematic structure of English and Arabic scientific texts to see whether they are similar or different in their progression and development. It draws on Halliday's (1985) Systemic Functional Grammar (SFG) to discover if English and Arabic scientific texts are similarly realized by comparing and contrasting them.

2. To examines the writing conventions of English and Arabic scientific texts to see if their occurrences and positions are similar or not.

3. To explore the importance of thematic structure in cohesive development of scientific texts.

THEMATIC STRUCTURE OF SCIENTIFIC TEXTS

Scientific texts feature an objective style of writing. Nord (2005, p. 195) discusses the features of scientific texts as being informative and written in an impersonal tone or in the third person plural. They are generally based on facts about the subject matter. The focus of scientific texts, Large (1989, p. 197) argues, should be on conveying the message and information as accurately as possible, rather than on stylistic presentation. The information provided in scientific texts should be clear, concise, unambiguous, non-redundant and non-repetitive. Therefore, translators who work on scientific texts should be aware of such issues and bear in mind that the target audience is expected to be a specific group of professionals who want to gain information while reading, and not be entertained (Javier, 2009). In addition, as scientific texts are not usually written in a very complex style but rather in a straightforward style, translators should not face linguistic problems they might encounter in literary texts (Large, 1989). However, the organization of sentence structure is crucial in order to successfully communicate with the intended audience.

Halliday (1985, p. 38) explains the thematic structure: Theme (given) and Rheme (new). Theme constitutes the "point of departure of a sentence" and the part from which Theme is developed is the Rheme. Dickins et al (2002, p. 119) state that English and Arabic tend to have the same theme-rheme structure (not subject and object or predicator) as they usually begin with the thematic element and end with the rhematic part. They explain that theme could consist of the main or a subordinate theme. The rheme could also include the main or a subordinate rheme. However, the theme-rheme pattern may pose a challenge to translators when the word order of a particular language is to be maintained, i.e. from passive to active voice, for example.

Correspondingly, there are three metafunctions of a text that Halliday (1994, p. 79) discusses in relation to theme structure. The first is textual theme which relates to a clause and the preceding part of it and is mostly realized by conjunctions and conjunctive adjuncts. The second is the interpersonal theme which relates to the "encoder's attitude" and the nature of language as a means of interaction, and is realized by vocatives, finite verbs and modal adjuncts. The third of Halliday's terms, experiential themes, is the most important one and is present in all clauses except non-finite clauses, as they allow omission. The experiential themes are realized by the function of transitivity as participants, processes or circumstantial elements (Ping, 2004, p. 27). These transitive components could be the first referential elements in one theme and then it is called a "topical Theme" (Wang, 2014, p. 56).

Further, a thematic structure may be marked or unmarked. Clause elements usually consist of subject, predicator, object, complement and adjunct. As has already been mentioned, themes usually occupy initial positions in sentences, but by altering the positions, for example, of a predicator, object or adjunct, the thematic choice would then be marked, as the structure did not follow the organizational flow of information. Subject plus predicator is the expected choice in English; therefore it is unmarked, whereas in Arabic predicator plus subject is not marked. Thus, fronting an element of a clause which usually occurs after a subject is unexpected in English and hence is labelled as marked (Baker, 1992, pp. 192-130). However, the characteristics of scientific texts that concerned with markedness and unmarkedness of thematic structure are more likely to be distinguished as unmarked. The translator, therefore, needs to bear in mind such conventions of English scientific texts and not to fail to adhere to the conventions of Arabic texts in terms of thematic and markedness structures.

METHODOLOGY

The data used in this paper is an 'offshore oil drilling' text extracted from an Australian website called 'Earth Science Australia' (2011). The text was originally taken from 'Australian Institute of Petroleum' as they are available for the public. Similar Arabic text has been found in a book entitled: *Oil Geography* (Rashid, 2015) in order to compare it with its English counterpart. The texts will be analyzed in terms of thematic structures and their occurrences and positions in sentences. The study explores the conventions of writing scientific texts in both languages in order to highlight differences and similarities of their thematic structures.

The audiences of the text are not experts in the field of oil drilling. The texts are designed for the general public who have an interest in gaining knowledge about offshore oil drilling. The audiences will gain knowledge and familiarize themselves with technical vocabulary on the subject, as well as learning about rig types and production platforms and other technical information. The texts explain the process of oil drilling from start to finish with a considerable amount of explanation of the various stages of the process. However, the study gives prominence to a certain amount of technical register and transitional sentences which translators could encounter while translating scientific texts.

Procedure

The texts were analyzed with the identification of theme type. Different types of themes were located in the English and Arabic texts. Sample of textual, interpersonal and experiential themes were analyzed to see how they were struc-

tured in English and Arabic. The data were qualitatively and quantitatively analyzed in the study. The qualitative analysis was conducted to identify the textual, interpersonal and experiential themes in both texts. This is to analyze their positions and study them from a translation point of view, and then comparing and contrasting them with their Arabic counterparts. Quantitative analysis, on the other hand, was carried out to identify the occurrences of all types of themes in the English and Arabic scientific texts.

ANALYSIS AND DISCUSSION

This section analyzes and discusses the thematic structure of scientific texts produced in English and Arabic. As it has been mentioned, the concept of theme and rheme is central to the function of sentences. The thematic choices made by authors have to do with text connexity, which is an issue of coherence in texts (Sade, 2007, p. 76). The three types of themes are discussed below with examples from English and Arabic themes. Tables 1 and 2 below show the occurrences of different types of themes in both texts. Due to the nature and the characteristics of science texts, it can be noted that interpersonal themes are the least frequent.

One major reason for applying theme and rheme analysis on scientific texts with respect to translation is to trace the theme positions in both languages in order to highlight differences and similarities between them. More importantly, the theme position directs the reader's attention to the elements of the text content that the sender wants to emphasize (Dejica, 2010). If this emphasis is repositioned elsewhere in the sentences by the translator, the sender's message and purpose could lose its effectiveness.

Textual Themes

Textual themes indicate the use of cohesive textual items that signal an occurrence of a new move in a text by employing coordinates, conjunctives, etc., which usually referring to the preceding clause. In Example 1, the use of the conjunctive adjunct 'but' has the role of the adversative with the preceding clause. Arabic uses such conjunctive in a similar position but usually preceded by the coordinate 'و' (and) which Ar-

abic heavily relies on especially at the beginning of every new sentence in the text. With the addition of 'and' the Arabic clause is said to be categorized with a multiple theme by using coordinate and conjunction. According to Rogers (2007), the use of such connectors increase the readability of scientific texts as the flow of reading Arabic is much cohesive with use of coordinates at the start of new sentences.

Example 1

But offshore, in deep and often stormy waters, it becomes an awesome undertaking.

ولكن التنقب في البحر وخاصتًا في مياه عميقة وهائجة تصبح عملية تحدي مميزة.

LT(Literal Translation): And but offshore drilling especially in deep and stormy water becomes featured challenging operation.

Example 2a below shows similar position of textual themes in the English and Arabic texts. It is clear that the position of the conjunctive adjunct conditional 'if' and the demonstrative 'this' appear at the beginning of the sentences. In fact, the referential demonstrative 'this' makes the sentence more cohesive by summarizing the information packed in the preceding clause and elaborating more on the second sentence. This can also be seen in the translations as they usually occupy initial positions in Arabic. Example 2b is an extract from the Arabic text wish exhibits the same use of the conditional 'if' which best can be translated into 'اذا' in this case. The thematic structure has been retained in the translation. Arabic favors such type of use of textual themes as Examples b2 further illustrates.

Example 2a

If the drilled hole is considered to be "dry" or not worth developing, the decision is made to "plug and abandon" it. This involves setting several cement plugs in the well.

إذا اعتبر البر المحفور "جاف" أو لا يستحق التطوير، فيتخذ قرار "السد والتخلي". وهذا يتضمن إعداد عدة سدادات اسمنتيّة في البئر.

Example 2b

وإذا كانت الطرق السيزمية والجاذبية هي، أساسا، أدوات للبحث عن البترول، فإن الطرق الكهربية تستخدم، عادة، للكشف عن المعادن.

LT: And if seismic and gravitational methods are mainly tools for oil exploration, then electric methods are usually used to detect metals.

Table 1. Shows occurrences of themes in English

Type of theme	Experiential	Interpersonal	Textual	Topical	Total
Occurrence	**26**	**2**	**16**	**34**	**78**
General Comment: The text is prevailed by explaining a process	Include temporal and spatial info, mostly explaining a process or stages of process	Low. No evaluation.	For linking	Mostly used impersonally	Written in short paragraphs

Table 2. Shows occurrences of themes in Arabic

Type of theme	Experiential	Interpersonal	Textual	Topical	Total
Occurrence	**34**		**37**	**28**	**99**
General Comment: Explanation and description of different methods of oil drilling	Spatial, temporal, describing processes		For linking purposes. Usually connecting long sentences	Mostly used impersonally	Long complicated sentences that reach long paragraphs

We can see the coordinate 'and' preceding the conditional 'if' in Arabic text. This is attributed to the fact that a theme does not necessarily consist of a single unit of a clause; it can have more than one clause units. Those other units in a clause are included in the text for cohesion in order to enhance the relation between the clauses. This is what is called a multiple theme (Stoian, 2017).

Example 3 below illustrates a case in Arabic which might be different from English. The use of 'another' in English functions as additive but it was fronted to keep the reader in suspense about what the other type of platform is. The sentence can start with 'Tension Leg is another type of platform...' This is what usually happens in Arabic:

Example 3

<u>Another platform type</u>, suitable for deep water production, is the Tension Leg platform...

منصة رجل الشد تعتبر <u>نوع أخر من المنصات</u> وهي مناسبة لإنتاج النفط
في المياه العميقة...

LT: The Tension Leg platform is another type of platforms, and it is suitable for deep water oil production.

To start the Arabic sentence with 'نوع آخر من المنصات مناسب لإنتاج النفط في المياه العميقة، هو منصة رجل الشد' (Another platform type, suitable for deep water production, is the Tension Leg platform) is definitely inappropriately structured. This is what makes the backgrounding of the textual theme crucial in Arabic for the sentence to unfold cohesively. The example above exhibits the concept of translation which in fact views "a translation as having the same function as the original or serving the same intended function" (Krein-Kühle, 2011, p. 393). This means that the target text carries the same informative function that specialists the source text enjoy (ibid).

Textual themes, which are represented in conjunctions, adverbial, modality, or transitional phrases such as 'finally', 'قد' (may), 'ثم تأتي بعد ذلك' (then comes after that) and 'وبصفة عامة' (And in general) as shown in Example 4 below, play an important role in guiding the reader through different steps and making the text explicitly coherent. Ventola (1995, p. 102) observes that "the Theme/Rheme patterns are important in guiding the reader through the logical paths constructed by the writer" because of the theme elements have been changed by the translator. This will then lead to that the reader's understanding is probably to be deviated.

Example 4

<u>Finally</u>, at the end of the well…

<u>وأخيرا</u> وفي نهاية حفر البئر...

LT: <u>And finally</u>, and at the end of well digging…

<u>وقد</u> تخرج المواد الأسفلتية على شكل تجمعات لدنة وأغشية رقيقة فوق
صخور سطح الأرض.

LT: Asphalt materials <u>may</u> be produced in the form of spherical aggregates and thin films above the surface rocks.

<u>ثم تأتي بعد ذلك</u> مرحلة المسح الجيوفيزيائي باستخدام الطرق السيزمية
والجاذبية والمغناطيسية والمقاومة الكهربية

LT: <u>Then comes</u> after that the geophysical survey phase, using seismic methods, gravity, magnetism and electrical resistance.

<u>وبصفة عامة</u> يستفاد من طريقة الجاذبية في تحديد الأحواض الرسوبية،
وامتدادها وسمكها.

LT: <u>And in general</u>, gravity is used to determine sedimentary basins, their extension and thickness.

Abdul-Raof (1998) states that Arabic language is relatively featured with free word-order in its structure of sentences. This allows different constituents of a clause such as predicator, complement and/or adjunct to be placed differently in the clause. According to Potter (2016), this is mainly because "Arabic has an inflection, or case-marking system, which helps to clarify the syntactical relations between constituents" (p. 6). Example 5 below is a case in point as it can take different unmarked forms. Some of the English literal translations are marked themes, as subject plus predicate is the expected choice of the flow of information in English (Baker, 1992).

Example 5

<u>الجيولوجيا ـ إذاً ـ من خلال</u> مشاهدات الصخور والآبار...

LT: Geology – <u>then</u> – through the observations of rocks and wells is…

<u>إذاً</u> الجيولوجيا <u>من خلال</u> مشاهدات الصخور والآبار...

LT: <u>Then</u> geology <u>through</u> the observations of rocks and wells is…

<u>من خلال</u> مشاهدات الصخور والآبار، <u>إذاً</u> الجيولوجيا...

LT: <u>Through</u> the observations of rocks and wells, <u>then</u> geology is…

<u>من خلال</u> مشاهدات الصخور والآبار، الجيولوجيا <u>إذاً</u>...

LT: <u>Through</u> the observations of rocks and wells, geology <u>then</u> is…

Interpersonal Themes

Interpersonal themes have a similar function of textual themes in terms of their use in a clause. They are usually part of a theme and cannot be a full theme as in the case of topical themes (Potter, 2016). Interpersonal themes tend to have low occurrence in the chosen text. The nature of scientific texts usually avoids use of writers' attitudes and opinions and this may explain the lower frequency of interpersonal themes.

Example 6

<u>Where you find oil</u>, you often also find water.

<u>واينما تجد النفط</u> تجد أيضًا الماء.

LT: Where you find oil, you also find water.

Other thematic structures, known as emphatic preposing theme (Dickins et al., 2002), are shown in Example 6 above. The theme taking place before the subject is called 'prepose', and emphatic means that the fronting of the theme has a purpose. The structure is maintained in Arabic for the same emphatic reasons as in English. Example 6 explains the foregrounding subordinate clause which falls outside the main clause, usually for informational purposes. However, this structure appears to have low occurrence in Arabic (Dickins et al., 2002, pp. 118-120)**.**

Experiential Themes

Theme of a clause is always realized by "the first group, or phrase, which has some function in the experiential structure of the clause" (Halliday, 2004, p. 66). The experiential theme functions "as a representation of some process in ongoing human experience" (Halliday, 2004, p. 59). There must be only

one experiential theme on a thematic structure of a clause which is referred to as topical theme (Potter, 2016). Thus, a considerably high number of experiential themes are used in the scientific texts. They usually appear in a noun, adverbial or adjective phrase preceding the main clause. In Examples (7, 8, 9 and 13), the use of experiential themes is found to be a description or explanation of a process. The high frequency of such occurrences is expected as the nature of the texts is operational and describes the stages of oil production. In Example 7 below, the author of the scientific text clearly fronts a circumstance related to the topic which is 'Locating an oil and gas "trap"'. However, to translate this adverbial clause into Arabic, the verb 'يعتبر' (is [considered]) has to come into play in the translation so that the thematic clause is not marked.

Example 7

Locating an oil and gas "trap" - as it is known - and extracting the oil and gas is difficult enough on land.

تعتبر تحديد مساحة النفط والغاز المعرفة بـ"تراب" واستخراج النفط والغاز صعب جدًا على اليابسة.

LT: Locating the oil and gas area known as "trap" and extracting oil and gas is [considered] very difficult on land.

Experiential themes are fronted to stress a point. The Arabic translation of Example 8 below could be more functional if the experiential theme 'during production' is backgrounded. If the translator maintains the same position of the experiential theme, he/she did not fault, but the clause is then *marked* in Arabic. In fact, this can definitely be done as shown in Example 9 which is an extraction from the Arabic parallel text of scientific nature.

Example 8

During production, oil is separated from the water by mechanical devices before...

يتم فصل النفط من الماء خلال عملية الإنتاج بإستخدام معدات ميكانيكيا قبل.

LT: The oil is separated from the water during the production process using mechanical equipment before.

Example 9

وفي العمل الميداني يرصد الرشح البترولي الذي قد يتخذ شكل طبقة بترولية رقيقة فوق سطح عين أو بحيرة أو نهر.

LT: And in the field work, petroleum filtration which may take the form of a thin petroleum layer is observed on the surface of a water spring, lake or river.

However, the Arabic language is different in terms of sentence structure as it usually starts with verbal phrases. The position of those experiential themes is not necessarily the initial, but may be embedded in the sentence or even placed at the end, as in Example 10. Similarly, the case in Examples 11, 12, 13 as the Arabic structure would read more cohesively with such unmarked choice of translations. It typically changes into a declarative sentence in Arabic with changing the word order, but without significantly changing the meaning of the sentence.

Example 10

وقد استخدمت طرق المقاومة النوعية والكهرومغناطيسية الأرضية في روسيا لإعداد خرائط الطبقات الرسوبية في مراحل الاستكشاف البترولي المبكرة.

LT: Ground resistance and geomagnetic methods were used in Russia to map sediment layers in the early stages of petroleum exploration.

Example 11

Before a well can be drilled, government approval must be obtained.

لابد من الحصول على موافقة الحكومة قبل البدء في حفر الآبار.

LT: Government approval must be obtained before wells can be drilled.

Example 12

In Australia, (temporal) nearly 90 per cent of our petroleum wealth is found offshore.

وحوالي 90% من ثروة أستراليا النفطية توجد في البحر.

LT: Around 90% of Australia's oil wealth is found offshore.

Example 13

Once oil or gas is discovered, the drilling rig is generally replaced by a production platform.

يستبدل جهاز التنقيب بعد أن يتم إيجاد النفط أو الغاز بمحطة إنتاج.

LT: The drilling rig is replaced after the oil or gas is discovered in a production platform.

Eggins (1993) notes that marked themes are employed to add emphasis to particular concepts in texts. She argues skilful writers use specific techniques such as adverbial and subordinate clauses to front new information. In Arabic, an unmarked theme can of course be represented by an experiential element functioning as a lexical verb, which subscribes to the 'processes' in terms of transitivity such as in the Arabic translation of Example 13 above. However, in order to conduct a thematic analysis of English and Arabic sentence structure in relation to scientific texts, the experiential themes in Arabic especially those referred to by circumstances could pose a challenge in translation. For example, the unmarked themes in Arabic will be measured against nominal, prepositional and adverbial phrases in English due to the syntactic difference between the two languages (Potter, 2016). Further Munday (1997) maintains that the syntactic difference between the two languages could influence source and target texts and force alteration of word order. In Examples 11 and 13 above the experiential themes seem to have been included into the rhematic structure, whereas in Example 12 it is still part of the experiential theme with a change of position. Indeed, this can be done if the translator judges that he/she with focus on style more than on the author's original emphasis. This is, in fact, a point that can be greatly argued among translation scholars as verbs in Arabic are thematic by default which means that the experiential themes represented by a verb is common in Arabic.

Halliday (2004) considers both the verb and the subject may function as the unmarked themes. Thus, if we apply this to Example 14 below, we can see that experiential element 'today' is still part of the thematic structure in Arabic with its change of position, which means including the experiential element into the subject, and still be unmarked. This proposition is supported by Halliday's analysis of non-declarative clauses. Example 15 below is from the Arabic scientific text. We can see the experiential element 'recently' is occupying an initial position. It can be argued that such use of time adverbial phrase is gaining ground into Arabic (cf. Ethelb forthcoming).

Example 14

Today, four types of offshore rigs are used...

وتستخدم اليوم أربع انواع من أجهزة التنقيب...

LT: Four types of drilling equipment are used today …

Example 15

وحديثاًتستخدم الأقمار الصناعية في رسم الخرائط الكنتورية للتغيرات في شدة المجال المغناطيسي لتحديد التراكيب الجيولوجية في مناطق المسح المغناطيسي.

LT: <u>Recently</u>, satellites <u>have been used</u> in contour mapping of changes in magnetic field strength to determine geological structures in magnetic survey areas.

RECOMMENDATIONS

The study makes these recommendations related to the translation of scientific texts in general:

a) It is recommended that the translators use available corpora to make sure of the most appropriate structure of scientific texts.

b) Translators need to pay a special attention to neologism and to the strategies applied in translating them. For example, they should see if transliteration or borrowing is the strategy to adopt.

c) It is important for translators to maintain the characteristics and conventions of the scientific texts of the target language.

d) It is advisable for translators to make thematic analysis even on a small scale to find out the theme/rheme structure that has the highest frequency in the target language.

e) It is also advisable to focus on the marked and unmarked structures of the target language and make decision of what to use accordingly.

f) Translators should have considerable information about the target audience and make decisions as to when to front or embed a particular thematic clause.

CONCLUSIONS

This study has made an attempt to investigate the theme/rheme structure of English and Arabic scientific texts from a translation point of view. It explored the textual, interpersonal and experiential themes in English and Arabic and found that the experiential themes appeared to have high occurrence in English as well as in Arabic, whereas as the interpersonal themes were the least frequent. The study aimed at analyzing the thematic structure of English and Arabic scientific texts to see whether they are similar or different in their progression and development by drawing on Halliday's (1985) Systemic Functional Grammar (SFG). It also investigated the aim of writing conventions between English and Arabic in term of occurrences and positions, and the importance of cohesive development in making scientific texts accessible in the target language. This paper has shown the importance of the thematic structure of a text and the arrangement of information in a sequence of clauses. It stressed the vitality of understanding and translating different types of themes. It concludes that themes may occupy different positions in the target texts, and the conventions in Arabic seem to be changing as a result of influence from translation, especially English into Arabic translation. The study encourages translators to carry out a thematic analysis and maintain the stylistic features of the target language of scientific texts. The study is not intended to make generalizations about the findings reached as it was based only on a small amount of data. Further investigation on the efficacy of Halliday's model in different text-types can provide validity to the findings of this study.

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