Temporal Dimension in Simultaneous Interpreting of Some Spoken Corpora of English-Arabic-English Language Pair

البعد الزمنى في الترجمة الفورية لبعض المدونات اللغوية المترجمة باللغتين العربية والإنجليزية

إعداد

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المستخلص باللغة العربية

يهدف هذا البحث إلى دراسة البعد الزمنى في الترجمة الفورية لبعض المدونات اللغوية المترجمة باللغتين العربية و الإنجليزية. تكونت المدونات اللغوية من ستة خطابات كنصوص المصدر (ثلاثة باللغة العربية وثلاثة بالإنجليزية) مع الترجمة الفورية لكل منهم إلى الإنجليزية وإلى العربية بالإضافة إلى رَوْمَنةِ اللغة العربية لنصوص المصدر و النصوص المترجمة. تم تقسيم نصوص المصدر إلى وحدات لغوية صغيرة، كل وحدة تحتوي على مجموعة أفكار متشابهة، ولها مكافئٌ في النص المترجم. تم تطبيق نموذج التحليل المقترح و الذي يتضمن البعد الزمنى (السكتات، معدل الكلام، معدل النطق والفترة الفاصلة) على هذه المدونات اللغوية. تم استخدام الأسلوب الكمى والكيفى لتحليل البيانات. و لقد خلص الباحث من نتائج الدراسة الحالية إلا أنَّ هناك أوجه تشابه واختلاف كبيرة بين الملامح الزمنية في المدونات اللغوية باللغتين العربية و الإنجليزية. كما أوصى الباحث من خلال نتائج دراسته بضرورة إكساب طلاب الترجمة الفورية القدرة على إتقان الأنماط الزمنية الصحيحة عند الترجمة من الإنجليزية إلى العربية و العكس و ذلك من خلال برنامج تدريبي قائم على الترجمة الفورية يتضمن الملامح الزمنية.

الكلمات المفتاحية: الملامح الزمنية – السكتات – معدل الكلام – معدل النطق – الفترة الفاصلة (الزمن بين الاستقبال و الإرسال) – الترجمة الفورية – المدونات الإنجليزية–العربية – المدونات العربية–الإنجليزية.

Abstract

This study aims to investigate the temporal dimension in simultaneous interpreting (henceforth SI) of some spoken corpora of English-Arabic-English language pair. The corpora of the study – six speeches (i.e., three delivered in Arabic and three in English) with their simultaneously rendered versions (i.e., three interpreted into English and three into Arabic) – are divided into segments in

which each source speech (henceforth ST) segment that consists of a similar set of ideas, has a rendered equivalent in the target speech (henceforth TT). The English-Arabic-English corpora are then transcribed verbatim with Arabic STs and TTs being romanized using a set of defined phonemes. An analysis model including pauses, speech rate, rate of articulation and Ear-Voice span EVS has been applied to the corpora of the study. The quantitative and qualitative methods are used to analyze the data obtained from the model. It is concluded that there are significant similarities and differences between the prosodic and temporal features of the English-Arabic corpus and those of the Arabic-English one. Based on these results, it is recommended that an SI-based training program including the temporal features can help the student interpreters make efficient use of the number and duration of pauses and speech rate for better articulation rate, moderate EVS and proper synchronization with the source speakers.

Key words: temporal features; pauses; speech rate; rate of articulation; ear-voice span EVS; simultaneous interpreting SI; English-Arabic corpus; Arabic-English corpus

1. Introduction

Pauses, as a surface variable, play an important part in uncovering some of the temporal features in SI between English and Arabic. Pauses can be divided into filled and silent types. Silent pauses, based on the time duration suggested by Sabol and Zimmermann (1984), can be subdivided into short (i.e., ranging from 100 – 300 milliseconds), normal (from 300 to 1350 ms.), long (from 1350 – 2200 ms.) and very long pauses (from 2200 – 2800 ms.). A number of interpreting research are conducted on pauses. These include Mead, 2015; Ahrens, 2005; Pradas Macías, 2006 and Martellini, 2013. For instance, in her study on German-Italian language pair, Martellini (2013, P. 76) concludes that the reason why the speech rate is lower in TTs than in ST is that the interpreters use the SI strategies, i.e., condensation, segmentation and reformulation, which lead them to produce a lower number of words. She also finds out that the TT has fewer pauses, and thus

their duration is greater than in the ST, confirming Ahrens' theory to which pauses in TTs have analysis functions.

Speech rate in SI seems to affect the performance of an interpreter. There is a difference between speech rate and rate of articulation in terms of how they are measured. According to Costello & Ingham (1984), Ingham & Riley (1998) and Hall et al. (1999), overall speech rate is measured as the speech produced in terms of words or syllables per minute or second, including both disfluencies and pauses shorter than 1–2 seconds. To measure overall speech rate more accurately, the entire duration of speech, including pauses, prolonged speech, and other interruptions such as interjections should be measured, but because extra repetitions of syllables and words would influence the counting of these linguistic units, they should be removed. However, the rate of articulation, the measurement of how fast the articulators move for speech production, is measured across some type of perceptually fluent linguistic unit (Ingham & Riley, 1998).

Ear-Voice Span (EVS) is one of the surface variables related to temporality, which, as stated by Timarová (2015, p. 418), refers to "the delay between the speaker's delivery and the interpreter's output in simultaneous interpreting". A number of scholarly research is conducted on EVS. These, for instance, include Paneth's (1957) EVS range (i.e., 2-4 seconds), Treisman's (1965) EVS range (i.e., 4 -5 words), and Oléron and Nanpon's (1965) EVS range (i.e., 2 to 10 seconds). However, Timarová (2015) claims that EVS can differ according to the interpreters and the type of speech whether spontaneous, structured, or unstructured. Few are the interpreting research conducted on EVS in English-Arabic spoken corpora. To the best of my knowledge, the only study that investigates EVS in SI from English into English and vise vera is the one conducted by El-Zawawy (2019) in which EVS is not always the same when performing SI into/from Arabic.

2. Statement of the Problem

Few are the scholarly studies conducted on the temporal dimension in SI. Thus, this study aims to investigate the temporal

dimension in SI of some spoken corpora of English-Arabic-English language pair. The temporal dimension includes pauses, speech rate and rate of articulation along with Ear-Voice Span (EVS). Accordingly, the following questions can be formulated.

3. Questions of the Study

1. What are the similarities/differences between pauses in SI of the spoken corpora of English and Arabic languages?
2. What are the similarities/differences between speech and articulation rates in SI of the spoken corpora of English and Arabic languages?
3. What are the similarities/differences between Ear-Voice Span EVS in SI of the spoken corpora of English and Arabic languages?

4. Objectives of the Study

The main purpose of this study is to investigate the temporal dimension in SI of some spoken corpora of English-Arabic-English language pair.

5. Literature Review

5.1 Pauses

Pauses, as defined by Mead (2015, p. 301), are "interruptions in the flow of speech. Their pattern of occurrence […] contributes to perception of a speaker's (or an interpreter's) fluency". Cruttenden (1997) refers to three positions where pauses seem typically to occur. First, pauses tend to occur at the boundaries that mark the major syntactic constituents (i.e., between clauses and between the subject and predicate). In this regard, the length of the pause depends on the type of constituent boundary. This means that the pause can be longer if the syntactic construction of the constituent is major or involves new information. Second, words that carry new information and are difficult for the interlocutor to guess are often preceded by pauses. The positions of the pauses that tend to occur before these words of high lexical content are "within a noun-phrase, verb-phrase, or adverbial phrase, e.g., between a determiner and following head noun". Third, in a tone unit a pause tends to occur after the first word. Pauses also occur in this

position when the speaker makes corrections of false starts or repetitions. This is known as 'error of performance' (p. 30).

According to Cruttenden (1997), Tissi (2000) and Cecot (2001), pauses can be divided into silent/unfilled pauses and filled pauses. El-Zawawy (2019) differentiates between silent and filled pauses based on Tissi's (2000) and Cecot's (2001) classifications by suggesting a new classification of 'speech non-fluencies in SI'. He (p. 68) claims that silent pauses can be subdivided into very long, long, optimal and short (or insignificant). These types of silent pauses can occur at sentence or clause initial position (i.e., initial décalage), or at intra-sentential or intra-clausal position (i.e., internal decalage).

SI research on pauses, according to Mead (2015, p. 302), can be divided into two main categories: quantitative analysis of interpreters pauses and listeners' perception of the interpreter's fluency. As for SI quantitative research on pauses, Mead's (2000, p.102) work on the control of pauses of the student interpreters shows significant differences in the performances of students interpreting from English (their B language) into Italian (their A language). In addition, the results of Tissi's (2000) study show that hesitation along with self-repairs are the main reasons for both silent and filled pauses. Another study by Cecot (2001) attributes the use of pauses by professional interpreters to the speed of the source speech in which the interpreters tend to make fewer pauses when the source speech is faster.

Ahrens' (2005) study refers to the differences in pausing between the source speaker and interpreters in which the interpreter's pauses tend to be less frequent and sometimes longer when compared with those of the SL speaker. Ahrens (p. 53) points out that if pauses are used frequently, they may disrupt and "may even hinder comprehension". Focusing on this line of research, Martellini (2013, P. 76), in her study on German-Italian language pair, finds out that the TT has fewer pauses, and thus their duration is greater than that is found in the ST, confirming Ahrens' view in which pauses in TTs have analysis functions. In this

respect, Ahrens (2005) claims that long pauses in the TTs may refer to the interpreter's need to have certain ST input before producing the corresponding TT segment. She also justifies the reason for interpreters' long pauses on the basis that an additional cognitive capacity is required when formulating ST message in the TL. Examples of such situation include: "lexical retrieval or syntactical planning, leading to a temporary halt in production" (p. 72).

5.2 Speech Rate & Rate of Articulation

For interlingual comparisons, speech rate as temporal dimension is used for measuring a speaker's/interpreter's performance. Speech rate is an umbrella term that covers both speaking rate and articulation rate. Speaking rate, according to Riccardi (2015, p. 398), is used to measure "the words or syllables per minute (or seconds) of a speaker's actual output, including pauses". Costello and Ingham (1984), Hall et al., (1999) and Ingham and Riley (1998) share the same view that speech tempo or speed is measured as the speech produced in terms of words or syllables per minute or second, including both disfluencies and pauses shorter than 1–2 seconds. In other words, to measure overall speech rate more accurately, the entire duration of speech, including pauses, prolonged speech, and other interruptions such as interjections should be included. However, given the notion that extra repetitions of syllables and words can influence the counting of these linguistic units, they should be removed.

The articulation rate, as stated by (Riccardi, 2015, p. 398), is viewed as "the speed of articulatory movements and refers to speech uninterrupted by pauses above a certain threshold, usually between 150 and 250 milliseconds, which are excluded from the measurement". This is supported by Ingham and Riley (1998) who point out that measuring the articulation rate is based on the notion that how fast the articulators move for speech production.

Given the different and unrelated linguistic systems of certain languages (e.g., English-Arabic language pair), the number of words uttered per time unit varies from one language to another. This depends on many factors such as the mean word length, the type and genre of the discourse, etc. Thus, syllables as a more

reliable unit of measurement can be used on such occasions. Even between speakers of the same language, speech rate production may vary depending on a number of cognitive, linguistic and social restrictions. The mode of delivery also affects speech rate production in that the speaker/interpreter produces their speech either spontaneously or based on a scripted text previously prepared to be read (Riccardi, 2015). It is worth noting that the duration and frequency of pauses that occur in the speech can affect the speech rate perception. Goldman-Eisler (1968), for instance, calculates the frequent use of pauses in both read speech and spontaneous (impromptu) speech and finds out that pauses constitute 30% of total speaking time in a read speech, and 50% in a spontaneous one.

In SI studies, speech rate is considered one of the input variables. As stated by Mead (2015, p. 191), it is a principal component of fluency that depends on speech features such as planned/unintentional pauses, repetitions, disfluencies, fillers, etc. It is also used for determining the amount of information that an interpreter can process in a specified time. For a comfortable speech rate of an interpreter, Lederer (1981) claims that for a read text, 100 words per minute is an ideal rate whereas for SI, the speech rate can range from 150 to 170 words per minute, with 170 words as maximum range and if exceeded, the interpreter cannot properly perform SI. Riccardi, however, states that a speech rate relying on the SL can range from 100 to 130 words per minute, which seems practically comfortable, whereas a speech rate is perceived to be fast when it ranges from 135 to 180 words per minute.

During SI, the source speaker's fast speech rate may have a negative effect on the interpreter’s performance. Gerver (1969, p. 162), for instance, points out that the interpreter’s production of pauses, omissions and errors can be caused by a fast speech rate. Focusing on this line of research, in Martellini’s (2013) study on the German-Italian language pair, the interpreters’ speech rate is determined. Her experimental material consists of six professional

interpreters who interpret an excerpt of a speech given by a German professor (i.e., the source speaker) into Italian. The result of Martellini's (p. 76) study shows that the interpreters' speech rate is lower than that of the source speaker. The reason why the interpreters produce a lower number of words is due to the use of SI strategies such as reformulation, condensation and segmentation. Another reason is that the interpreters have to wait for new material (i.e., the information from the upcoming source speech segments) to be cognitively processed. In addition, the relationship between speech rate and intonation is interrelated. Riccardi (2015, p. 399) points out that when the speech rate is high, the type of intonation associated tends to have a flattened contour. This leads to a more cognitive load, and thus has negative impact on comprehension.

5.3 Ear–voice span

Ear–voice span (EVS), also known as *decalage or time lag* refers to the 'interval' between the time in which the interpreter hears what the source speaker says and the time in which s/he delivers their SI (Timarová, 2015, p. 418). There are possible ways to measure time lag. It can be measured by means of units of time, or the number of content words. Paneth (1957), whose research on SI is considered among the first academic contributions, measures EVS obtained from experimental data, which shows that the average values of EVS range from 2 to 4 seconds. Oléron and Nanpon (1965), however, claim that the EVS can range, for various language combinations, from 2 seconds to 10 seconds. They further state that an interpreter is required to comprehend a sufficient amount of SL information before starting the interpreting task, and this may take time depending on the positions of certain key words and syntactic elements such as the predicate.

In order to show to what extent EVS or time delay is affected by the cognitive activity, Treisman (1965, p. 369) measures EVS of both SI and shadowing (i.e., immediate verbatim repetition of the input in the same language). The data of her study includes untrained bilingual participants. She asks them to perform shadowing and SI. The results show that EVS or time lag for the

interpreting task tends to be longer (4-5 words) than that of shadowing (3 words). This might explain the cognitive load caused by the heightened decision that the simultaneous interpreter has to make during an interpreting task. Thus, according to Timarová (2015), "while there is an observed average time lag, it is not always the same for all interpreters and all types of speeches" (p. 419).

6. Methodology

6.1 Corpora Transcription & Segmentation

All the STs and TTs of the corpora are transcribed verbatim with Arabic STs and TTs being romanized by adopting a set of defined symbols for the sounds and transcribed phonemically. As for the segmentation strategy adopted in this study, the ST is divided into chucks/segments. Each segment contains a unit of thought or set of ideas, which are translated in the TT. Thus, the unit of thought in the ST segment has a rendered equivalent in the TT. This also means that corpus segmentation in this study is not based on equal time duration between ST and TT.

6.2 Instruments

For the purpose of the study, the following instruments are used:

1. A model for analyzing the temporal dimension (i.e., pauses, speech rate, rate of articulation and EVS) in SI of spoken corpora of English-Arabic-English.
2. The acoustic analysis software PRAAT (version: 6.3.17) and Audacity software for audio editing (version: 3.3.3).

7. Delimitations of the Study

The experimental part of the study is delimited to the following:

a. Six speeches on political topics drawn from international TV channels on YouTube to represent the English-Arabic-English corpora, delivered in 2021 and 2022.
b. Some temporal features including pauses, speech rate, rate of articulation and Ear-Voice Span EVS.

8. Data Analysis and Discussion

The method of analysis used is divided into two parts: quantitative analysis and qualitative analysis. Quantitative analysis focuses the

sum total of pauses (normal, long, very long), speech rate and rate of articulation along with the Ear-Voice Span (EVS) in both the ST and TT. Statistical analyses are performed on these prosodic and temporal data gathered from SI of the English-Arabic-English. Qualitative analysis is concerned with contrasting the temporal features of the English-Arabic corpus with those of the Arabic-English one and highlighting some of the strategies used by the interpreters given the diverse nature of each language.

8.1 Temporal Dimension of the English-Arabic corpus

The English-Arabic corpus of this study consists of three speeches (STs) delivered in English and three corresponding renditions in Arabic (TTs). In this section, the temporal features of the three STs and their TTs are numerically presented and analyzed. Table 8.1 shows the sum total of time duration, length, speech rate, number and time duration of pauses and rate of articulation of both English STs and Arabic TTs of the English-Arabic corpus. It also presents the average values of all the temporal features of the STs and those of the TTs.

Table 8.1 The sum total and average values of the temporal features (pauses, speech rate and rate of articulation) of the English-Arabic corpus

Speech	ST &TT	Time Duration (sec.)	Length (No. of sylls)	Speech Rate (Sylls/s)	No. of Pauses	Total Pause Duration (sec.)	Articulation Rate (Sylls/s)
Speech One	*ST*	539	1387	2.58	170	178	3.88
	TT	536	1930	3.57	66	77	4.17
Speech Two	*ST*	613	2411	3.94	151	119	4.89
	TT	598	2897	4.84	88	78	5.57

Speech Three	*ST*	365	1628	4.43	133	90	5.92
	TT	367	1583	4.28	94	54	5.0
		Total Duration	Average length	Average speech rate	Total pause	Total pause duration	Average articulation rate
	ST	1517	1809	3.7	454	386	4.9
	TT	1501	2137	4.23	248	209	4.96

It is clear from the data in table 8.1 that the average length, that is the number of syllables of the STs (i.e., 1809 syllables) is a bit lower than that of the TTs (i.e., 2137 syllables) of the English-Arabic corpus. This is indicated by the relatively higher average of speech rate of the TTs, which is 4.23 syllables per sec. than the STs, which is 3.7 syllables per sec. However, the average articulation rate of the STs (4.9 syllables per sec.) is quite close to the TTs (4.96 syllables per sec.) given the total pause duration of both STs (386 secs.) and TTs (209 secs.).

The average value of the speech rate presented in table 8.1 shows that the source speakers produce a bit fewer number of syllables in one second (i.e., 3.7) than the interpreters (i.e., 4.32). Given the statistical fact that these values are not different, the English-Arabic interpreter makes few pauses, i.e., 248 times with a total duration of 209 seconds.

An in-depth analysis of the number and duration of normal, long and very pauses (See Table 8.2) shows that the English-Arabic interpreters use a reasonable number and duration of optimal pauses (i.e., 212 pauses) with a total duration of 133 seconds and long pauses (27 pauses in 43 seconds). The mean pauses duration ranges from 45.67 milliseconds to 1.746.66 milliseconds. This range of pause duration is included within the normal type of pauses (i.e., 300 – 1350 ms.) based on Sabol and Zimmermann's (1984) classification of pauses. The values presented above indicate the heavy cognitive load, which leads to high English-Arabic interpreting performance.

Table 8.2 Number, duration and sum-total of normal, long and very long pauses in the English-Arabic corpus

Type of pause	Normal pause		Long pause		Very long pause		Total No.	Total Dur. (Sec)	Mean (se)	Min. (sec	Max. (sec
	No.	*Dur. (Sec)*	*No.*	*Dur. (Sec)*	*No.*	*Dur. (Sec)*					
Speech One											
ST	130	91.5	28	54.8	12	31.3	170	177.6	1.070	0.74	1.41
TT	46	38.9	15	24	5	14.2	66	77.1	1.220	0.62	1.77
Speech Two											
ST	147	112.2	4	6.6	-	-	151	118.8	0.79	0.65	0.97
TT	78	50.2	6	9.7	4	18.5	88	78.4	0.91	0.45	2.64
Speech Three											
ST	128	82.5	5	7.5	-	-	133	90	0.69	0.58	0.83
TT	88	44.2	6	9.3	-	-	94	53.5	0.55	0.30	0.83
SUM TOTAL	Normal pause		Long pause		Very long pause		Total No.	Total Dur. *(Secs.)*	Av. Mean	Av. Min.	Av. Max.
	No.	*Dur. (Secs.)*	*No.*	*Dur. (Secs.)*	*No.*	*Dur. (Secs.)*					
ST	405	286	37	68.9	12	31	454	386	0.850	0.65	1.07
TT	212	133	27	43	9	33	248	209	0.407	0.46	1.75

8.2 Temporal Dimension of the Arabic-English Corpus

In this section, the Arabic-English corpus contains three Arabic STs and their simultaneously rendered TTs in English. Both STs and TTs in terms of the temporal features are statistically presented and analyzed with reference to the temporal features. Unlike the findings presented in the previous section, table 8.3 displays different statistical values of the Arabic-English corpus in respect of the temporal features. So, the sum total and averages of duration, length, speech rate, number and duration of pauses and rate of articulation of the Arabic STs and English TTs along with the types of pauses (i.e., normal, long and very long) are presented.

Table 8.3 The sum total and average values of the temporal features (pauses, speech rate and rate of articulation) of the Arabic-English corpus

Speech		Duration (sec.)	Length (No. of sylls)	Speech Rate (Sylls/se	No. of Pause	Total Pause Duration (sec.)	Articulation Rate (Sylls/sec.)
Speech Four	*ST*	576	1964	3.42	173	176	4.95
	TT	588	1386	2.39	152	182	3.50
Speech Five	*ST*	480	2361	4.96	150	86	6.03
	TT	493	1303	2.66	113	135	3.63
Speech Six	*ST*	576	2792	4.87	214	148	6.53
	TT	582	1352	2.50	227	214	3.67

SUM		Average length	Average speech rate	Total pauses	Total pause duration	Average articulation rate
S	1632	2372	4.42	537	410	5.84
T	1662	1347	2.52	492	530	3.60

It is evident from the data in table 8.3 that in the Arabic-English corpus, the STs have a higher average length than that of the TTs. This is also supported by the average values of the speech rate, which is 4.42 syllables per sec. in the STs and 2.52 syllables per sec. in the TTs. After removing all pauses and other instances of disfluency and self-repair, the average rates of articulation of both the STs and TTs show different results. The average value of the TTs (i.e., 3.60 syllables per second) is considerably higher than that of the STs (i.e., 5.84 syllables per sec.). This value is also confirmed by the average pause duration, which is 530 seconds in the TTs and 410 seconds in the STs.

Table 8.4 Number, duration and sum-total of normal, long and very long pauses in the Arabic-English corpus

Type of pause	Normal pause		Long pause		Very long pause		Total No.	Total Dur. (Secs.	Mean (sec.	Min (sec	Max (sec.
	No.	*Dur. (Secs*	*No.*	*Dur. (Secs*	*No.*	*Dur. (Secs*					
Speech Four											

ST	146	134	26	40	1	2.2	173	176.2	1.036	0.769	1.30
TT	110	94.5	30	52.9	12	34.3	152	181.7	1.223	0.7	1.88
Speech Five											
ST	149	84.4	1	1.4	-	-	150	85.8	0.57	0.43	0.97
TT	90	68.1	11	19.1	12	47.4	113	134.6	1.23	0.40	2.34
Speech Six											
ST	192	108.7	18	28.7	4	11.1	214	148.2	0.71	0.48	1.30
TT	180	123.3	35	55.9	12	34.8	227	214	0.97	0.76	1.47
SUM TOTAL	Normal pause		Long pause		Very long pause		Total No.	Total Dur.	Av. Mean	Av. Min.	Av. Max.
	No.	*Dur. (Secs.*	*No*	*Dur. (Secs.*	*No*	*Dur. (Secs.*		*(Secs.*			
ST	487	327	45	70.1	5	13.3	537	410	0.77	0.56	1.2
TT	380	286	76	128	36	117	492	530	1.14	0.62	1.90

The numeric data of the types of normal, long and very long pauses provide detailed description of the interpreter's performance when operating from Arabic into English. Table 8.4 show that in the Arabic-English corpus, the total number and duration of the normal pauses (i.e., 380 times/286 secs.) are significantly higher than those of the long (i.e., 76 times/128 secs.) and very long pauses (i.e., 36 times/117 secs.). However, these values do not reflect reasonable interpreting performance.

Based on the classification of pauses range into milliseconds, the mean pauses duration in the Arabic-English corpus ranges from 6.20 milliseconds to 1.896.67 milliseconds, which is located within the normal range (i.e., 300 – 1350 ms.). As for the long and very long pauses, there is a noticeable increase in the number of long pauses and very long pauses. This is indicative of, as also claimed by Ahren (2005), the dire need for having extra cognitive capacity to process the Arabic STs messages before producing the English TTs messages.

8.3 Ear-Voice Span (EVS)

Viewed as the time lag between the source speaker's input and the interpreter's output when performing an SI task, *Ear-Voice Span* (EVS) yields varied results when measured in the English-Arabic-English corpora. First, EVS in the English-Arabic corpus, as shown in table 8.5 is measured in seconds, not in words, due to the morphological and syntactic discrepancies between English and Arabic. So, it is evident that the English-Arabic interpreters tend

to have a maximum EVS of 0.15 syllables per second and a minimum of -0.90 syllables per second. The average value is -0.58 syllables per second in which the source speakers' average rate of speech is 3.7 syllables per second and that of the interpreters is 4.23 syllable per second.

Table 8.5 The speech rates of both the source speakers and interpreters along with EVS in the English – Arabic Corpus

Speech (EN. – AR.)	Speaker's speech rate (Syllables per second)	Interpreter's speech rate (Syllables per second)	Ear-Voice Span EVS (Syllables per seconds)
One	2.58	3.57	-0.99
Two	3.9	4.84	-0.90
Three	4.43	4.28	0.15
Average	3.7	4.23	-0.58

Based on the time duration suggested by Oléron and Nanpon (1965) that EVS can range, for various language combinations, from 2 seconds to 10 seconds, the average length of EVS in the English-Arabic corpus is not located within, yet below this range. In addition, this negative value (-0.58), which is extremely short, indicates that the interpreters do not make many/frequent pauses before producing the TTs messages, but use more words than the original. it is also indicative of the interpreter's frequent use of the anticipation strategy. This is also supported by the difference between the total time duration of the interpreters' pauses, which is 209 seconds and that of the source speakers, which is 386 seconds. This finding goes in line with El-Zawway's (2019) study that average EVS, when operating from English into Arabic is low on the scale. Thus, one can say that there is no major time difference between the interpreter's ST reception and TT production due to the cognitive load caused by the heightened decisions that the simultaneous interpreter is to make during an interpreting task.

In table 8.6, the Arabic-English interpreters tend to have a maximum EVS of 2.37 syllables per second and a minimum of 1.03 syllables per second. The average value is 1.90 syllables per second in which the source speakers' average rate of speech is 4.42 syllables per second and that of the interpreters is 2.52

syllable per second. The average EVS of the Arabic-English corpus is considerably longer in duration than that of the English-Arabic corpus. The average speech rate of the source speakers seems significantly higher, which consequently leads to the frequent use of pauses by Arabic-English interpreters. So, this EVS range (1.90 syllables per second) indicates that the interpreters whose total duration of pauses is 530 seconds take longer time to produce the TTs segments than the source speakers whose total duration of pauses is 410 seconds.

Table 8.6 The speech rates of both the source speakers and interpreters along with EVS in the Arabic- English Corpus

Speech (AR. – EN.)	Speaker's speech rate (Syllables per second)	Interpreter's speech rate (Syllables per second)	Ear-Voice Span EVS (Syllables per seconds)
Four	3.42	2.39	1.03
Five	4.96	2.66	2.30
Six	4.87	2.50	2.37
Average	4.42	2.52	1.90

Furthermore, the Arabic-English interpreters need more time to perceive and process the ST messages, where cognitive processes such as information retrieval and reformulation are performed, and then produce the TT messages. It is also clear that in the Arabic-English corpus, the interpreters seem to miss/skip many STs' segments to cope with the source speakers. This is due to the fast delivery of the source speakers, which makes it difficult for the Arabic-English interpreters to keep pace with ST messages. So, they tend to make extremely long pauses with a total duration of 128 seconds and very long pauses with a total duration of 117 seconds. This finding is at odds with El-Zawawy's (2019) study result which arrives at the conclusion that when operating from Arabic into English, pauses and time lags (EVS) do not frequently occur. However, in this section of the study, the interpreters, instead of using the anticipation strategy, make frequent use of condensation strategy and gist translation/interpretation. This is also indicated in the average length of all English TTs (i.e., 1347 syllables) with an average speech rate of 2.52 syllables per second.

9. Summary of Results and Discussion

Provided in this section is an overview of the temporal features of the English-Arabic corpus and to what extent they differ from those of the English-Arabic corpus in terms of pauses, speech rate and rate of articulation. First, the total number of pauses of the English-Arabic interpreters in this study is small. For instance, in speech one, the interpreter does not exceed 66 pauses in 8 minutes 55 seconds. This reasonable number of pauses (i.e., 248) with reference to the time durations of the rendered speeches (i.e., 1501 secs. or 25 mins.) explains why SI from English to Arabic involves cognitive load of time limits. However, the total number of pauses that the Arabic-English interpreters make is relatively high (i.e., 492 times) when compared with that of the source speakers (i.e., 537 times). In the simultaneously rendered version of speech five, for instance the interpreter pauses 113 times in a total duration of 8 minutes and 13 seconds. Thus, this excessive use of pauses with reference to the overall time durations has a negative impact on comprehension. This is also confirmed by El-Zawawy (2019, p. 118) who claims that the Arabic-English interpreters do not maintain a reasonable number of pauses in SI. So, according to Ahren (2005, p. 53), if pauses are used frequently, they may disrupt and "may even hinder comprehension".

Second, the average speech rate of the ST delivery in the English-Arabic corpus is 144.6 per minute (3.7 syllables per second). According to Riccardi (2015), ST speech rate is perceived to be fast when it ranges from 135 to 180 words per minute. So, this rate is located within the range of fast speech delivery, which in turns affects the performance of the English-Arabic interpreters as they work under cognitive and time pressure to minimize the number and duration of pauses, the thing that makes their rate of speech relatively higher. This might explain the need for an additional capacity when formulating the Arabic TT messages.

In the Arabic-English corpus, the high number and duration of pauses of the interpreters is caused by the fast speech rate of the

source speakers (4.42 syllables per second). This fast speech delivery has a negative impact on the interpreters' performance because, unlike the English-Arabic interpreters who minimize the use of pauses, the Arabic-English interpreters tend to pause a lot, compress and sometimes omit some of the STs' segments. This supports Ahren's (2005) finding that the simultaneous interpreter needs to stop for a while to retrieve lexical and syntactic information to do the interpreting task efficiently. This is also clear as the interpreters' average speech rate is 2.52 syllables per second. This means that they produce a low number of syllables/words. This finding goes in line with Gerver's (1969) study results that successful production of the output (TTs) depends on the input (STs) rate of speech. This finding also supports Martellini's (2013) experimental study, which investigates the effect of the source speech speed on the interpreter's performance in which the interpreter makes use SI strategies such as condensation, the strategy adopted by the Arabic-English interpreters in this study. It also confirms the results of El-Zawawy's (2019) study in which the Arabic-English interpreters seem to be unable to cognitively process the input instantly as needed. Thus, there is a heavy load on the part of the interpreters to make proper use of their cognitive repertoire.

Third, rate of articulation, given the formality and structured flow of the English STs delivery, in the English-Arabic corpus, the interpreters' TT segments seem to be synchronous with the source speakers' STs. This is confirmed by the rate of articulation for both in which it is 4.9 syllables per second for the STs and 4.96 syllables per second for the TTs, which is nearly the same. This means that there is a structural correspondence between the English STs and Arabic TTs as the interpreters tend to keep the same positions of pauses as made by the source speakers. This finding also supports Gerver's study results (1971) in which the simultaneous interpreter's performance is made easier when the source speaker makes normal pausing in input speech so that successful output can be produced.

The excessive use of pauses, however, in the Arabic-English corpus does not allow the English TTs to structurally correspond

with the Arabic because the source speakers do not make normal pausing in their speeches. This asynchronization is clear in the difference between the average articulation rate of the source speakers (5.84 syllables per second) and that of the interpreters (3.60 syllables per second). This finding also confirms Barik's (1973) claim that poor and inaccurate SI performance occurs when the interpreter lacks necessary and sufficient information as the source speaker makes unexpected and/or unusual pauses at ungrammatical locations.

10. Conclusion

The Arabic-English interpreters' frequent use of high number and long duration of pauses, which is also evident in their slow speech rates, shows the use of some translation strategies such as condensation and compression in which some of the source textual elements can be wrapped up, or in the worst case, omitted/skipped. However, in the English-Arabic corpus, the infrequent use of pauses by the interpreters may be attributed to the heavy cognitive load caused by instant linguistic decisions that the interpreters have to make within the strict time limits of SI task.

The equal average values of the rate of articulation in the English-Arabic corpus are indicative of the structural correspondence between the ST and TT segments because the interpreters tend, as possible as they can, by minimizing the use of pauses, to maintain the same positions of pauses as made by the source speakers. However, in the Arabic-English corpus, the source speakers do not make pauses on a regular/normal basis, yet unexpected pauses at ungrammatical locations tend to occur. As a result, the interpreters' excessive use of pauses makes it difficult to allow the TT segments to structurally align with the ST ones.

The extremely short EVS in the English-Arabic corpus is indicative of the less frequently used pauses by the interpreters as they make extensive use of the anticipation strategy, which is crystal clear in using more words in the TTs than the original (STs). The long EVS in the Arabic-English corpus indicates that

the interpreters take much time to perceive and process the ST messages, where cognitive processes such as lexical, syntactic and intonational retrieval and reformulation are performed. As a result, the production of the TT messages is delayed.

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