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Effects of Explicit Connected Speech Instruction on Libyan EFL Learners' Perceptions of Listening Comprehension Problems in Speech Recognition, Parsing and Utilisation

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Abstract

This quasi-experimental study examined the effects of explicit connected speech instruction in reducing EFL learners' listening comprehension problems associated with speech recognition, parsing and utilization. Sixty-two (N = 62) Libyan intermediate-level EFL learners, aged 19 to 21, served as the subjects. They were randomly assigned to either the treatment (n = 32) or control group (n = 30). The treatment subjects were exposed to explicit instruction on the features of connected speech for one term (i.e., 12 weeks). An adapted Listening Comprehension Processing Problems questionnaire was administered to both groups before and after the treatment in order to investigate the problems they encountered in comprehending connected speech. The questionnaire contained items measuring language comprehension difficulties in three categories, i.e., speech recognition, parsing, and utilisation. Following the 12-week intervention, the treatment group showed a significant improvement in their report of comprehension problems, while the control group remained constant or unchanged in their perception of the problems. The effect sizes of the differences between the treatment and control group were large, ranging between d = 1.14 (parsing) and d =1.19 (recognition). The findings highlight the necessity to teach connected speech recognition in the EFL curriculum to improve learners' listening comprehension ability.

Keywords: *Connected speech, connected speech instruction, listening comprehension problems, parsing, utilisation, Libyan EFL learners*

INTRODUCTION

Connected speech refers to natural, casual speech produced as a continuous sequence of utterances with some phonological features occurring at varying degrees of frequency. In spoken English, connected speech processes (CSPs) result when certain sounds are reduced, hence rendering them hard to pick up when listening, especially by non-native speakers of English. This problem has been previously attributed to the lack of "perceptual saliency" in connected speech forms (Henrichsen, 1984). Perceptual saliency, in particular, makes speech more comprehensible and understood by learners (Henrichsen, 1984). Connected speech, on the other hand, is a speech pattern that reduces perceptual saliency, making the speech less comprehensible to the listener. Reduced saliency caused by connected speech can have a great impact on learning English in general, and on learners' understanding of speech and their perception of listening comprehension problems. How listeners recover the intended phrase or expression, for example "green mire" from /griːm maɪər/, has been a major focus of spoken word recognition theories.

CSPs have posed a considerable comprehension challenge for English-as-a-foreign language (EFL) learners (Brown & Kondo-Brown, 2006; Henrichen, 1984). However, how much the variations caused by CSPs in casual spoken speech affect EFL learners' listening comprehension has not received enough attention. In other words, these phonological features, like many other aspects of pronunciation, have not been adequately dealt with in the language classroom, despite the important role they play in facilitating language comprehension (Brown & Kondo-Brown, 2006). Thus, learners' ability to perceive connected speech forms must be adequately developed in the EFL classroom because some phonological features can be difficult to decode and very challenging to comprehend for EFL learners.

Listening and pronunciation are two intricately connected language skills. The relationship between the two competencies is formed by the fact that listening and speaking are very much intertwined and that extensive exposure to listening materials can lead to the development of good English pronunciation among EFL learners (Vandergrift, 1999; Veselovska, 2016). The way adult learners master a language should be similar to the way children learn their first language. Both will need to receive enough listening input before they can start using the target language. Since pronunciation is developed from listening, the lack of instruction on how to listen effectively, how to pronounce words correctly and how to recognise speech patterns, therefore, will affect learners' ability to acquire good pronunciation. Neglecting to teach listening skills adequately in the EFL classroom will cause learners to develop pronunciation problems and deficiency (Suwartono, 2014).

EFL learners tend to experience considerable problems in comprehending spoken English because they are not well-taught in this aspect of language learning. Learners' listening and pronunciation skills are often underdeveloped because universities and schools tend to pay more heed to English grammar, reading and vocabulary. In fact, listening and speaking are not treated

as key elements of language learning in many textbooks or syllabi, with writers and language educators not seeming to pay much attention to these skills when writing their textbooks or teaching EFL classes (Tomlinson & Masuhara, 2018). In practice, listening has not been given much attention by both teachers and learners, which could mean that there is little understanding of its significance (Osada, 2004).

According to Anderson (2000), language comprehension develops in three phases. The first phase involves perceptual processes through which the acoustic or written forms are encoded (i.e., *recognition* of the connected words/phrases). The second phase is *parsing* where the words in the acoustic or written messages are transformed into a mental representation of the combined meaning of the words. The third phase is utilisation, where the learner activates a mental representation of the sentence being uttered in order to get its meaning. The three phases occur chronologically, while remaining interrelated. Listening comprehension problems may occur during any of the above three phases (Anderson, 2005; Goh, 2000; Vandergrift, 2003). Anderson's (2000) cognitive framework of language comprehension has been adopted by many researchers, for example Goh (2000), Zhang (2008), and Nowrouzi et al. (2015), who used it to identify and examine the listening difficulties of ESL learners in their respective studies.

Issues related to listening skills among EFL learners, particularly Arab EFL learners, are varied. Higgins (1995) studied the listening comprehension issues of Omani EFL learners and discovered that the determinants of listening comprehension accuracy included the speaker's rate of speech, vocabulary, and pronunciation. Hasan (2000), who analysed the listening comprehension issues of 81 Arabic speakers learning EFL for educational purposes, reported that rapid rate of speech, unclear pronunciation, failure to recognize words, and missing parts of the text were identified as significant contributors to listening comprehension problems among 81 Arabic EFL learners. In Hamouda's (2013) study of Saudi EFL learners, 95% of the respondents found it hard to identify the words they knew due to how the words were uttered or pronounced. Hamouda attributed this difficulty to how the Saudi learners learned new words or expressions, that is, by learning their written forms only and not their spoken forms, as in how the words would be connected to other words in speech. Consequently, they were unaware of how the new words or expressions would sound when uttered rapidly and interspersed or conjoined with other words, nor could they understand how the pronunciation of the words would be altered by such combination.

These previous studies give us an understanding of why Arab EFL learners experience difficulties in listening to and comprehending connected discourse in English, the main reason being that listening is a neglected skill, or what Nunan (2002) dubbed as the "Cinderella skill in second language learning" (p. 238). Some of the difficulties stem from their inability to perceive and understand connected speech explanations. The same case is being argued in the present study, that is, listening to natural connected speech can be similarly difficult for Libyan EFL learners. Their difficulties are often ascribed to native language interference (Najeeb,

2013), which is understandable because Arabic is the main language used among Libyans in their everyday conversation. Libyans learn English only after they have mastered their non-standard Arabic (Libyan Arabic) as their mother tongue at home, on top of the Standard Arabic varieties they use in school. Moreover, Libyan learners do not have the opportunity to be taught by native-speaker English teachers. In other words, they lack the exposure to listening to authentic, native-speaker speech. Libyan schools also lack advanced facilities such as functional language labs and other audio-visual aids that make learning the foreign language more interesting and accessible to every individual learner (Pathan & Marayi, 2016). These issues may explain why Libyan learners find it difficult to learn English, in general, and English listening and pronunciation, in particular.

There have been scores of studies on explicit connected speech instruction in the ESL and EFL contexts, employing the highly popular survey method as one of the ways to collect data and obtain information about learners' perceptions of connected speech instruction. These studies (e.g., Kuo, 2010; Musfirah, 2019; Rahimi & Chalak, 2017; Kuo, Kuo, & Lee, 2016) found that learners' interest in listening increased after being taught connected speech. Therefore, to find out if connected speech instruction could also benefit EFL learners in Libya, the present study investigated the effects of explicit connected speech instruction on EFL learners' perception of the listening problems they encountered using the quasi-experimental method.

Research Question

The study addressed the following research question: *"What are the effects of explicit connected speech instruction on Libyan EFL learners' perceptions of connected speech recognition, parsing and utilization problems?"*

CONCEPTUAL FRAMEWORK

According to Anderson (2000), language comprehension occurs in three phases. The first phase is the perceptual process where the learner encodes the acoustic or written forms of the speech. This is called recognition. In the second phase, known as parsing, the learner turns the acoustic or written messages he/she heard into a mental representation. In this stage, the combined meaning of the words or speech is visualised in the learner's mind. The third phase is utilisation where the learner puts the mental representation of word meanings into active use. Anderson (2000) maintained that the three phases occur in a chronological order and are closely interrelated. Anderson's cognitive framework of language comprehension, explained in greater detail below, has been used quite extensively in many language studies to examine and understand the listening difficulties experienced by ESL and EFL learners (Goh, 2000; Nowrouzi et al., 2015; Zhang, 2008).

Recognition Phase

A major problem for speech recognition is the segmentation of the objects to be recognised by the listener. Problems with segmentation arise when the phonemes that make up a spoken word need to be identified. This is because human speech is continuous, and the phonemes are not discrete in the way that letters are on a printed page. Segmentation at this level is analogous to decoding letters in cursive handwritingwhere one letter runs into another, and as is the case with letters in writing, different speakers also vary in the way they produce the same phonemes (Anderson, 2000).

Another difficulty in speech recognition involves a phenomenon known as coarticulation (Anderson, 2000). In coarticulation, various phonemes overlap, and this increases the difficulty in segmenting phonemes. It also means that the actual sound produced for one phoneme will be determined by the context of the phonemes around it. Rost (2005) explained that word recognition is the most important problem for L2 listeners because the unreliability and the inconsistency of the cues for marking word boundaries in connected speech produce a wide range of conventions which the listener needs to know. Field (2003) also explained various problems related to word recognition, which include "reduction, assimilation, elision, resyllabification, and cliticization" (p. 329).

Parsing Phase

Language is structured according to a set of rules that tell the user how to proceed from a particular string of words to an interpretation of the meaning of the word string. In learning to comprehend a language, learners acquire a great many rules that encode the various linguistic patterns in the language and relate these patterns to meaning interpretations (Anderson, 2000). Therefore, the problems that learners may encounter during the parsing phase include syntactic and semantic problems.

Some instances of syntactic problems are listeners' quickly forgetting what is heard, failing to form a mental representation of the words heard, and not understanding the subsequent parts of input because of earlier problems (Goh, 2000). Meanwhile, semantic problems occur when learners are distracted with the meaning of certain words that may be redundant, hence missing other parts of the message because of the limited processing capacity of their short-term memory and shallow processing (Goh, 1999).

Utilisation Phase

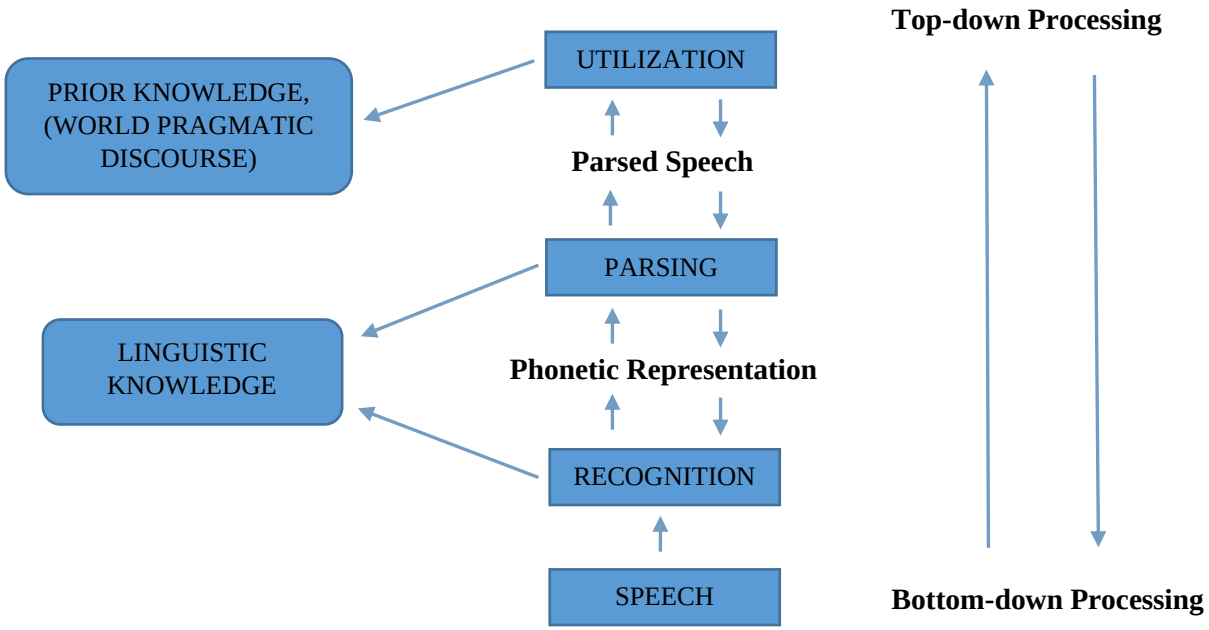
Once a sentence has been parsed and mapped into a representation of its meaning, an action is expected of the listener. The speaker expects the listener to make a response by answering a question or obeying a command, or even doing something based on the sentences presented to

them, rather than just passively registering the sentences (Anderson, 2000). Here the problems L2 learners may face are mainly related to pragmatics. According to Thomas (1995), pragmatic competence is "the ability to communicate meaning in a socially appropriate manner and to interpret meaning—whether explicit or implicit—on the basis of context" (as cited in Taguchi, 2008, p. 424). Taguchi (2008) explained that "to become pragmatically competent, one needs to be linguistically competent and able to both assess contextual information and use linguistic resources appropriately according to context" (p. 425). Pragmatic problems will arise when listeners understand the meaning of individual words but fail to realise their intended meaning as a whole. Similarly, discoursal problems occur when the listener is unable to understand the flow of ideas in connected speech. Both pragmatic and discoursal problems are related to the practical use of language which, according to Taguchi (2008), entails "the ability to control the complex interplay of language, language users, and the context of language use" (p. 424).

The advantage of applying this cognitive model of language comprehension in identifying the listening issues and difficulties of language learners is that the researchers would be able to pinpoint the problems more accurately. With this knowledge, they can also suggest strategies and remedial input to help the learners to overcome challenges related to listening. In turn, when learners are aware of these phases, it will help them to improve their metacognitive skills that they can rely on to comprehend the language. Figure 1 shows the three cognitive processes in L2 listening comprehension model as proposed by Anderson (2000) (as cited in Vandergrift & Goh, 2012)

Figure 1

Cognitive Processes in L2 Listening Comprehension (Vandergrift & Goh, 2012)



METHODOLOGY

Research Design

This study used the quasi-experimental, pretest-posttest control group research design, which divided the data collection process into three stages, i.e., the pretest, a 24-session intervention of explicit instruction on connected speech, and the posttest. The phases can be represented schematically as follows (Figure 2):

Figure 2

Schematic Representation of the Study's Quasi-Experimental Design

Group	Pretest	Treatment	Posttest
Treatment	O_1	X	O_2
Control	O_3		O_4

In Figure 2, O_1 and O_2 stand for the treatment group's pretest and posttest, while O_3 and O_4 refer to the same tests administered to the control group. X is the study's intervention (i.e., connected speech instruction) which was rendered only to the treatment group. The subjects were selected from intact groups and randomly assigned to either the treatment or control group, hence meaning that random assignment was utilised in the study.

Subjects

The subjects comprised 62 Libyan male and female learners between the ages of 19 and 21, and were selected from the intact groups of students enrolled in the Fall semester of the 2021 academic year in the English Department of the Sabratha University in Libya. They were all native speakers of Libyan Arabic and had at least two years of tertiary education. All subjects were placed at the intermediate level of proficiency in English based on the results of their final test in the previous academic term. Having the same EFL proficiency level, they were selected as two whole intact groups and then randomly assigned to the experimental group (n=32) or control group (n=30) to fulfil the sampling requirement of a quasi-experimental design. The number of subjects in the control group and experimental group was almost equally distributed to enable the study to make a methodologically justifiable comparison of the treatment effects between the groups.

Learning Content

For the learning material, some theoretical explanations of the targeted phonemic connected speech features were taught to the treatment subjects, for example, asking for the meaning of assimilation and the types of assimilation, then giving recorded examples and explaining the

types of assimilation the examples showed. Each feature of connected speech was presented with relevant audio or video illustrations. Table 1 presents a partial list of the connected speech taught as the intervention in the quasi-experiment.

Table 1

Part of the Content Taught in the Intervention (Explicit Connected Speech Instruction)

	Perception of Connected Speech	Types of Phonological Feature	Examples of Phonological Feature
1	Phonemic features of Assimilation	1- C1 = coronal and C2 = non-coronal	"in Cairo" /ɪn ˈkaɪrəʊ/ [ɪŋ ˈkaɪrəʊ] "that girl" /ðæt gɜːl/ [ðæk gɜːl]
		2- C1 and C2 = non-coronals	"big company"/bɪgˈkʌmpəni/ [bɪkˈkʌmpəni]
		3- C1 and C2 = coronals	"this shoe"/ðɪs ʃuː/[ðɪʃ ʃuː] "in those"/ ɪn ðəʊz/ [ɪn̪ ðəʊz]
2	Linking:	Linking [r]	far away [fɑːr əˈweɪ]
	vowel-to-vowel (V-V)	Intrusive [r] Linking with /j/	the sofa(r)in the catalogue [səʊfə(r)ɪn] they always [ðeɪʲəlwiːz]
		Linking with /w/	too easy [tuːʷiːziː]
	consonant-to-vowel (C-V)	VC+V sequence	give in [gɪ‿vɪn]
3	Elision	/t/ and /d/ elision in cluster consonants (across word boundaries)	They're second hand /ðeɪ ə sekənd hænd/ [ðeɪ ə sekən hænd]
		/t/ and /d/ elision in cluster consonants (within a word)	aspects /aspekts/ [aspeks]
		Schwa elision (following aspirated sounds /p, t, k/)	perhaps /pəhæps/ [pʰhæps]
		Schwa elision (becoming a syllabic consonant)	tonight /tənaɪt/ [tn̩aɪt]
		Elision of /v/ (followed by a consonant)	waste of time /weɪst əv taɪm/ [weɪst ə taɪm]
		Elision of a whole syllable (the syllable /lə/ is elided)	particularly /pəˈtɪkjʊləli/ [pəˈtɪkjʊli]

Table 1
Continued

	Perception of Connected Speech	Types of Phonological Feature	Examples of Phonological Feature
4	Vowel Reduction	function words: Auxiliary verb "have"	Which have you seen? /wɪtʃ əv ju si:n/
		function words: Auxiliary verb 'can'	I think we can do it /aɪ θɪŋk wi kən du ɪt/
		function words: Preposition "to"	'Try to stop' /traɪ tə stɒp/
		function words: Pronoun "his"	'Take his name' /teɪk ɪz neɪm/

Intervention

The treatment group received the intervention in the form of explicit connected speech training for 12 weeks during their regular class sessions. Kuo et al. (2016) suggested 12 to 16 weeks for an intervention to show any significant degree of effectiveness, where anything less than 12 weeks may likely be "inadequate to attain significance" (p. 107). Two sessions were conducted per week to come up to a total of 24 learning sessions. Each session took about one hour. The four aspects of connected speech (i.e., assimilation, linking, elision, and vowel reduction) were spread out over the 14 lessons. Each lesson was covered in two sessions, except for four review lessons, which were covered in one session each.

In the early stage of the intervention programme, the subjects were given simple exercises, in addition to explanations about connected speech features. The EFL learners' task was to identify phonemic features in the phrases given before identifying them in complete sentences. Following this activity, the subjects were given more advanced exercises. For example, they were asked questions about a specific topic to predict the content of a listening activity by using their background knowledge about the topic or situation. Additionally, some pictures or keywords were provided by the teacher to help the learners in their prediction of the content. Then, a bottom-up listening activity was conducted—this was designed to help the learners recognise division between words. The teacher asked the learners to listen to a number of recorded sentences and then asked the learners to write down the words and their total number. While the task might sound easy, the weak forms of normal connected speech can be quite problematic for the EFL learners, so it was very important for the teacher to say the sentences in a very natural way, rather than dictating them word-by-word.

Also, the learners were asked to watch training videos on their computers. During the video viewing, they answered content-related questions placed on PowerPoint slides and presented using the projector. In the questions, the learners needed to identify the phonemic feature of connected speech that each phrase on the slides contained.

In the advanced stage of the programme, the subjects were asked to produce some forms of connected speech. For example, the learners were exposed to different aspects of connected speech and asked to listen carefully to some sections of a movie and try to understand how native speakers' speech worked. After each section of the movie, the teacher asked the learners to repeat what they had heard in a natural way—by trying to imitate the actor's or actress' speech in the movie. Such technique was expected to increase the learners' awareness of the aspects of connected speech in native speakers' discourse, thereby enabling them to speak like semi-native speakers.

Instrument

The Listening Comprehension Processing Problems questionnaire (LCPQ) was adapted from Nowrouzi et al. (2015) to uncover the listening and comprehension problems that Libyan EFL learners experienced in comprehending English connected speech. The LCPQ adopted Anderson's (2005) three-phase model of language comprehension comprising recognition, parsing, and utilising. Recognition deals with the learner being able to correctly identify or recognize the acoustic or written forms of the connected speech they heard, retaining them in the working memory for the second phase, i.e., parsing. Parsing is the effort taken by the listener/reader to transform whatever is seen or heard into a mental representation of the combined meaning of the acoustic or written stimuli. This mental representation is related to the existing knowledge or "schemata" stored in the long-term memory and used by the learner during utilisation.

The questionnaire had 38 items and used a five-point Likert scale (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Usually, and 5 = Always). The items in the questionnaire were classified according to the three phases, with perception problems being measured by 18 items, parsing problems by 11 items, and utilisation problems by 9 items. Some sample items representing perception, parsing and utilisation problems are provided in Table 2.

Table 2

Sample Questionnaire Items Measuring Perception, Parsing and Utilisation Problems

Category	Questionnaire Item
Recognition	1. I find it difficult to recognize every single word of incoming **connected speech.**
	2. I find it difficult to recognize the signals which indicate that the speaker is moving from one word to another.
	3. I have difficulty in recognizing sounds due to fast speaking.
Parsing	1. I forget quickly the connected words or phrases I just heard.
	2. I do not understand the meaning of sentences in the connected speech
	3. I find it difficult to interpret the meaning of a long **connected speech** text.
Utilization	1. I find it difficult to understand **connected speech** texts in which there are many unfamiliar expressions including jargons and idioms
	2. I do not understand the intended message of an entire text of **connected speech.**
	3. I find it difficult to get a general understanding of the connected speech from the first listening.

Apart from these three phases, there are other factors that may affect L2 learners' listening ability, such as their age, aptitude, gender, learning style, and beliefs about themselves as EFL learners (e.g., self-concept and self-efficacy about listening and specific listening problems, their causes, and possible solutions) (Vandergrift et al., 2006). These demographics were also included in the questionnaire.

Validity and Reliability of the LCPQ

The adapted LCPQ was content validated by a panel of three experts and translated into Arabic to ensure that the EFL learners could fully understand the items asked. Learners received the questionnaire in English, with Arabic translation given below each statement. The translation was checked for accuracy and clarity by an Arabic linguist who was also a native speaker of Arabic. It was piloted with a number of Libyan EFL learners for additional feedback on the clarity of its items. The data were analysed for reliability using the Cronbach's alpha, yielding good internal consistency estimates of $\alpha = 0.90$, $\alpha = 0.89$, and $\alpha = 0.89$, respectively, for recognition, parsing and utilisation problems.

Data Collection

The treatment group was given explicit instruction on connected speech features with the aid of a laptop and CDs and content-related books. The learners in the control group, meanwhile, did not receive any instruction on the target features and only attended their normal, everyday English classes. Both groups were taught by the same Libyan English teacher.

After the intervention, the subjects were asked to respond to the LCPQ, which was distributed to both groups of EFL learners to assess their perceptions of the difficulties associated with comprehending connected speech and listening comprehension in English. The aspects of English connected speech covered in the LCPQ were assimilation, linking, elision, and vowel reduction. Before answering the questionnaire, the EFL learners took a listening test so that they could base their responses in the questionnaire on real listening tasks (Vandergrift et al., 2006). Prior to the LCPQ administration, the learners were reminded to be frank in reporting their comprehension problems and that there were no right or wrong answers to the questions. All these procedures took about 60 minutes.

Data Analysis

The SPSS (Statistical Package for Social Sciences) software was used to calculate the means, frequency counts and standard deviations of learners' responses to the LCPQ items. Each phase of the listening problems was analysed separately. Due to the design of the study, which was based on clusters (i.e., two intact classes comprising the treatment group and another two comprising the control group), generalised estimating equation (GEE) was applied on the data to compare differences between and within groups. In other words, the GEE was applied because this study was based on clusters and not on individual randomisation (since the study's subject selection was not randomised). GEE (generalised estimating equation) was applied to evaluate the effects of the connected speech instruction on the subjects' assessment of connected speech problems in three categories (i.e., perception, parsing and utilisation).

Because age and gender were significantly different between the treatment and control groups, the two variables were included in the analysis as covariates. Therefore, the GEE was employed twice to assess whether there were significant differences in EFL learners' perceptions across time between the two groups.

RESULTS

Subject Demographics

Table 3 presents the demographic characteristics of the experimental subjects (N = 62). A majority in the treatment group (71.9%) and control group (93.3%) were female and aged between 20 and 21. Table 2 also shows the purpose of enrolling in the English course for most of the subjects in the experimental group (71.9%) and control group (56.7%), which was to improve their English.

Table 3
Demographic Characteristics of the Subjects (N = 62)

Variable	Level	Treatment	Control
Gender	Male	9(28.1)	2(6.7)
	Female	23(71.9)	28(93.3)
Age	19	1(3.1)	0(0)
	20	13(40.6)	2(6.7)
	21	18(56.3)	28(93.3)
Reason for taking the EFL course	To improve own English	23(71.9)	17(56.7)
	To get a job promotion	0(0)	2(6.7)
	To pursue graduate studies	5(15.6)	8(26.7)
	To secure a new job	3(9.4)	3(10)
	Other reasons	1(3.1)	0(0)

Pretest Scores on Connected Speech Problems: Treatment and Control Group Differences

The assumption of homogeneity for the research variables for both treatment and control groups was examined by applying the independent samples t-test. Both groups' distributions of scores on their perceptions of connected speech problems were assessed for normal distribution. The results produced no significant differences between the two groups for all three categories of problems, i.e., perception problems, parsing problems, and utilisation problems. Table 4 shows the pretest scores on perceived connected speech problems for both the treatment and control groups.

Table 4
Comparison of Pre-Test Results between the Treatment and Control Groups

Problem Category	Treatment	Control	t	*p*
	Mean (SD)	Mean (SD)	value	value
Recognition	57.93 (14.68)	55 (11.57)	0.871	0.387
Parsing	36.81 (9.98)	34.46 (7.88)	1.022	0.311
Utilisation	29.68 (8.46)	27.83 (6.79)	0.947	0.347

Treatment and Control Groups' Differences in Recognition Problems: A Comparison

The GEE results, presented in Table 5, showed that the main effect of group was significant, which means that there was a significant difference between the groups (χ^2= 7.849, p=0.005). In addition, there was a significant effect of time on the total score of perception problems (χ^2= 15.397, p<0.001). Therefore, the interaction between time and group, after excluding the effect of the covariates, was significant (χ^2= 14.472, p<0.001), which means that the two groups had a different pattern over time (from the pre-test to the post-test) for the perception problems.

Table 5
Results of GEE on Perceived Recognition Problems between the Treatment and Control Group

Source of variation	Wald Chi-Square	df	P value
Group	7.849	1	0.005
TIME	15.397	1	<0.001
Group * TIME	14.472	1	<0.001
Gender [a]	0.024	1	0.877
Age [a]	1.422	1	0.233

Note. a: Covariates, Group: control vs. experimental, Time: pre-test, post-test

To compare the level of recognition problems between the two groups across time (i.e., between the pre-test and post-test), the Bonferroni post-hoc test was applied. The results, presented in Table 6, revealed that the differences in mean scores of recognition problems between the treatment and control groups in the pre-test was not statistically significant (p=1.000), while being significant for the post-test (p<0.001). There was also a significant difference between the pre-test and post-test of the treatment group on their recognition problem scores (p<0.001), but no significant difference in the control group (p=1.000). For differences relating to recognition problems, the effect size was calculated for both groups across time and the results pointed to a large effect of connected speech instruction on the recognition problems reported

by the treatment group (*d* =1.19), while an extremely small effect was observed for the control group (*d* =0.02).

Table 6

Between- and Within-group Mean Comparison on Recognition Problems

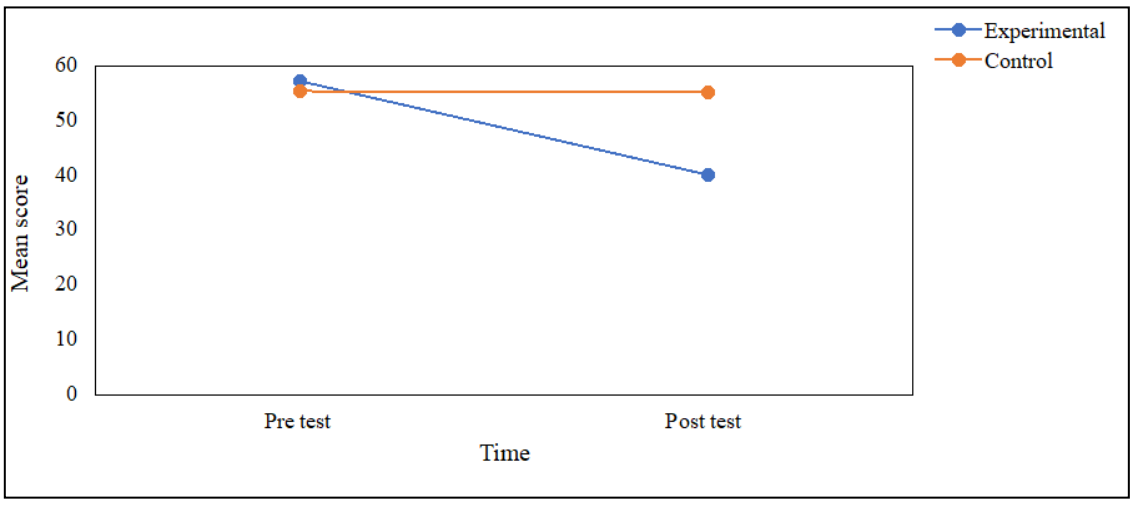
Groups	Pre-test		p value [a]	Post-test		p value [a]	p value [b]	Effect size d
	Mean	SE		Mean	SE			
Experimental	57.397	2.662	1.000	40.179	1.510	<0.001	<0.001	1.19
Control	55.576	2.126		55.310	2.433		1.000	0.02

Note. a: P value for between-group comparison, b : P value for within-group comparison

Figure 3 shows the level of recognition problems in the pre-test and post-test for both groups where the level of recognition problems perceived by the treatment group decreased significantly after the intervention, while the control group's perceived recognition problems showed no change.

Figure 3

Perceived Levels of Recognition Problems Reported in the Pre-Test and Post-Test for Both Groups



Treatment and Control Groups' Differences in Parsing Problems: A Comparison

The results from the GEE, presented in Table 7, show that the main effect of group was not significant, which means that there was no significant difference between the groups (χ^2= 3.673, p=0.055). However, there was a significant effect of time on the total score of parsing problems (χ^2= 18.639, p<0.001). From these results, the interaction between time and group, after excluding the effect of the covariates, was significant (χ^2= 15.522, p<0.001). This means that the two groups had a different pattern over time (i.e., from the pre-test to the post-test) for parsing problems.

Table 7

Results of the GEE on Parsing Problem Scores

Source of variation	Wald Chi-Square	df	P value
Group	3.673	1	0.055
TIME	18.639	1	<0.001
Group * TIME	15.522	1	<0.001
Gender[a]	0.605	1	0.437
Age [a]	0.553	1	0.457

Note. a: Covariates, Group: control vs. experimental, Time: pre-test, post-test

As for the level of parsing problems between the two groups across time (between the pre-test and post-test), the results of the Bonferroni post-hoc test, shown in Table 8, revealed that the difference in their pretest scores on parsing problems was not statistically significant (p= 0.708), while the difference between both groups in the post-test was significant (p<0.001). There was also a significant difference between the pre-test and post-test in the experimental group on the parsing problem scores (p<0.001), while for the control group, there was no significant change (p=0.798). The effect size of the parsing problem differences was calculated for both groups across time. The results indicated a large effect of connected speech instruction on the parsing problems reported by the subjects in the treatment group (d=1.14). In contrast, a small effect was observed for the control group (d =0.06).

Table 8

Between- and Within-group Mean Comparison on Parsing Problem Scores

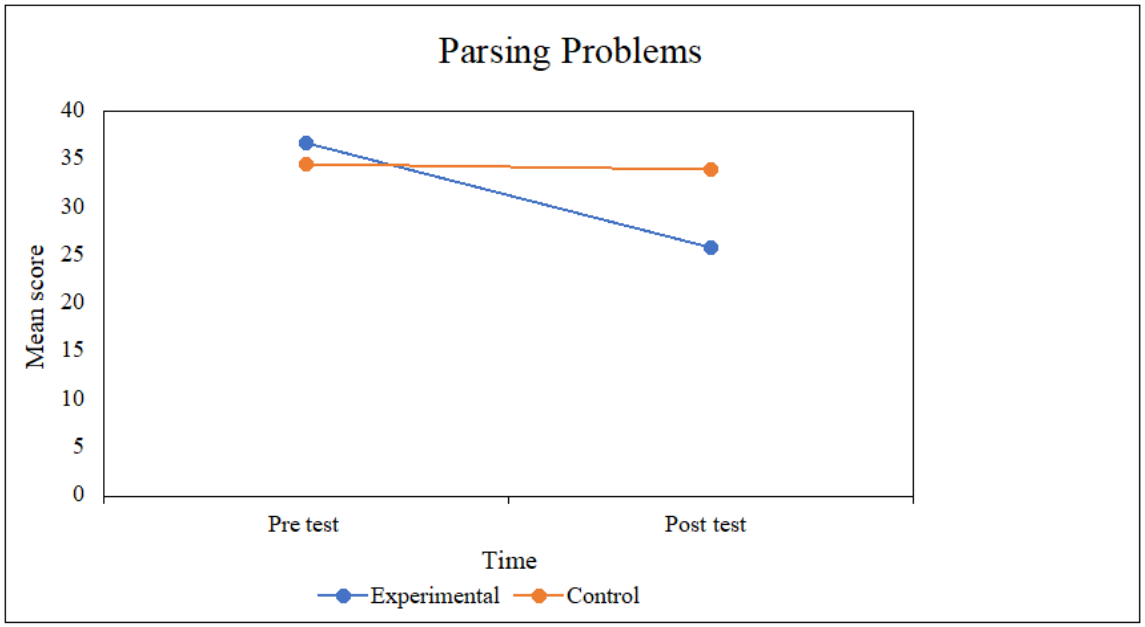
Groups	Pre-test		p value [a]	Post-test		p value [a]	p value [b]	Effect size d
	Mean	SE		Mean	SE			
Experimental	36.756	1.793	0.708	25.818	0.918	<0.001	<0.001	1.14
Control	34.527	1.434		34.027	1.298		0.798	0.06

Note. a: P value for between-group comparison, b: P value for within-group comparison

Figure 4 shows the level of parsing problems in the pre-test and post-test for both groups where the level of parsing problems reported by the treatment group decreased after the intervention, while the control group's report of parsing problems remained constant.

Figure 4:

Perceived Levels of Parsing Problems in the Pre-Test and Post-Test for Both Groups



Treatment and Control Groups' Differences in Utilising Problems: A Comparison

Table 9 shows the GEE results in regard to the learners' report of utilisation problems. The main effect of group was significant, which means that there was a significant difference between the two groups (χ^2=5.099, p=0.024). In addition, there was a significant effect of time on the total scores of the utilisation problems (χ^2= 17.396, p<0.001). Based on these results, the interaction between time and group, after excluding the effect of covariates, was significant

(χ^2= 16.676, p<0.001). In other words, the two groups showed different patterns over time (from the pre-test to the post-test) for the reported utilisation problems.

Table 9

Results of GEE on Utilisation Problem Scores

Source of variation	Wald Chi-Square	df	P value
Group	5.099	1	0.024
TIME	17.396	1	<0.001
Group * TIME	16.676	1	<0.001
Gender [a]	0.267	1	0.605
Age [a]	0.806	1	0.369

Note. Group: control vs. experimental, Time: pre-test to post-test

To compare the level of utilisation problems between the two groups across time (from pre-test to post-test), the Bonferroni post-hoc test was again applied. The results in Table 10 reveal that the difference in the total scores of utilisation problems reported by the treatment and control groups in the pre-test was not statistically significant (p =1.000), while the difference between the two groups in their post-test reports was statistically significant (p<0.001). The results also show a significant difference in the reported utilisation problem scores between the pre-test and post-test of the treatment group (p<0.001), while in control group, no significant change was observed (p=1.000). The effect size was calculated for both groups across time and the results pointed to a large effect of connected speech instruction on the treatment group's report of utilisation problems (d =1.15). In contrast, a negligible effect size was found for the control group (d =0.01).

Table 10

Between- and Within-group Mean Comparison on Utilisation Problem Scores

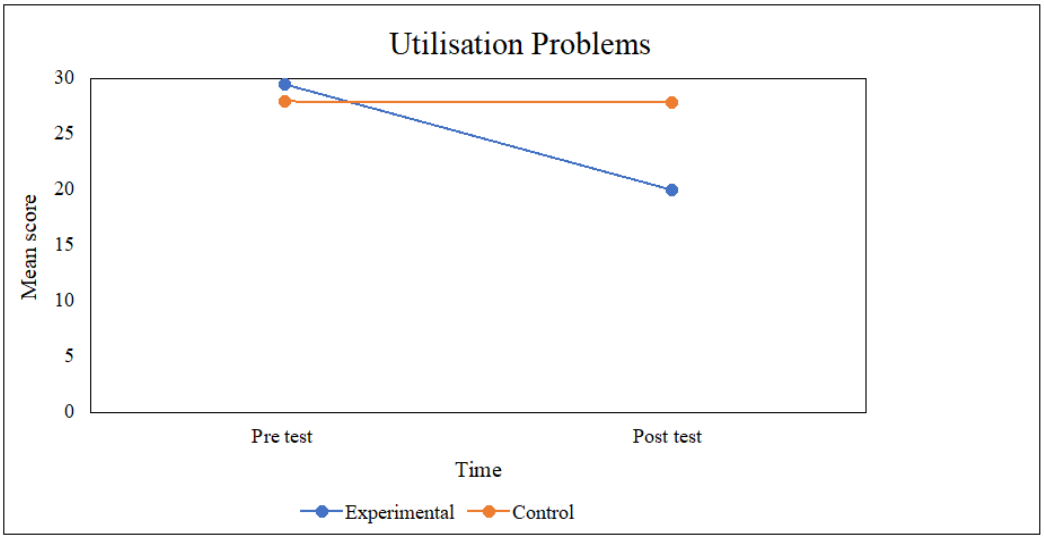
Groups	Pre-test		p value [a]	Post-test		p value [a]	p value [b]	Effect size d
	Mean	SE		Mean	SE			
Experimental	29.521	1.530	1.000	20.052	0.815	<0.001	<0.001	1.15
Control	28.011	1.243		27.911	1.238		1.000	0.01

Note. a: P value for between-group comparison, b: P value for within-group comparison

Figure 5 shows the levels of utilisation problems in the pre-test and post-test for both groups. It can be seen that the treatment group's perceived utilisation problems decreased after the intervention, while the control group's report of utilisation problems showed no change.

Figure 5

Levels of Utilisation Problems at Pre-Test and Post-Test for Both Groups



DISCUSSION

This study examined differences in Libyan EFL learners' perceptions of listening comprehension problems associated with English connected speech after receiving explicit instruction on how to interpret and fathom such speech. The EFL subjects' reports of three categories of speech problems were assessed following the intervention, namely the recognition, parsing, and utilisation aspects of connected speech in English. The use of the LCPQ revealed significant differences with large effect sizes in the treatment group in terms of the recognition, parsing and utilisation problems they reported in the posttest.

Generally, the post-intervention findings demonstrated a significant increase in the subjects' awareness and understanding of connected speech in English. For instance, their speech recognition problems in listening decreased after being taught the aspects of connected speech ($p< 0.001$). This pattern contrasted with that of the control group, whose level of recognition problems remained unchanged ($p =1.000$). For example, the mean value for item 9, "*There are words that I would normally know in writing, but when I hear them in a stream of connected speech, I find it difficult to tell where one word finishes and another begins*", for the treatment subjects dropped from 3.06 in the pre-test to 1.87 in the post-test. This significant drop reflected their change in perceiving the listening comprehension problems and the positive learning from the intervention. It could be inferred that the intervention (i.e., explicit connected

speech instruction) was helpful in improving the treatment subjects' comprehension of connected speech and the problems associated with it.

Likewise, the treatment subjects' report of parsing problems in listening decreased after being explicitly instructed on the aspects of connected speech (p <0.001), while the control group maintained a negative report of experiencing parsing problems (p= 0.798). For example, the mean value of the treatment group's responses for item 26, "*I find it difficult to understand connected speech when the topic is unfamiliar*", dropped considerably from 4.06 in the pre-test survey to 2.58 in the post-test. This is an indication of the positive change in the EFL learners' perceptions of the connected speech problems as a result of the intervention. Apparently, the training had helped alleviate the problems the subjects had with their parsing of sentences in connected speech.

Finally, the treatment group's utilisation problems in listening decreased yet again after being taught the aspects of connected speech (p <0.001), a change that was not observed in the control group (p= 1.000). This could be seen in item 32, "*I find it difficult to get a general understanding of connected speech from the first listening*" where the mean value of their agreement with this statement dropped from 3.47 in the pre-test to 2.35 in the post-test. This reflected the positive impact of the intervention on the treatment subjects' perception of speech utilisation difficulties, which significantly decreased after the connected speech training. Based on the results, it can be inferred that the training had substantially improved the subjects' comprehension of English connected speech.

It is worth noting that there were no significant differences found between the two groups in the pre-test survey results, where the p values for all three components were 0.387, 0.311, and 0.347, respectively, for recognition, parsing, and utilisation problems. What made this interesting was that both groups of learners started off with an unfavourable perception of listening to connected speech in English, thus reinforcing the point made earlier in this paper that EFL learners do face problems with listening to and comprehending connected speech.

The results of the present study are comparable to those of previous studies that had adopted Anderson's 3-phase listening comprehension model. Among others, the results supported Goh (2000) and Nowrouzi et al. (2015), and similar to their participants, the subjects in this study also exhibited more difficulties in the recognition phase. Even after the intervention, although the treatment group's reported problems in listening to connected speech did decrease remarkably, their problem with the recognition phase of listening (M=40.18; SD =8.07) did not improve as significantly as that of the parsing phase (M=25.82; SD =4.84) and utilisation phase (M=20.05; SD =4.08).

These results, therefore, show that Anderson's (2005) model is of substantial value to EFL teachers as it enlightens them on how they should teach English pronunciation and discourse accordingly. By adopting this model, teachers would be able to pinpoint students' probable

listening problems more accurately and with this knowledge, they can also suggest strategies and remedial input to help learners overcome challenges related to listening. Similarly, when learners are aware of the listening comprehension phases, they can rely on their awareness to improve their metacognitive skills, which are handy in comprehending spoken language, especially connected speech. It is with these advantages in mind that the researchers took to developing the intervention of the study.

LIMTATION OF THE STUDY

Before concluding, one limitation of the study should be addressed, that is, its small sample size of 62 subjects. During data collection, quite a number of learners who had responded to the post-test survey on their perception of the problems encountered in listening to connected speech had earlier failed to participate in the pre-test survey. Therefore, their responses—being incomplete for comparison—had to be eliminated from the analysis as their inclusion would affect the results of the study. This had substantially reduced the cases usable for the analysis, hence affecting the study's sample size and subsequently, the overall quality and utility of the results.

CONCLUSION

The findings have revealed EFL learners' perceptions of the problems dealing with English listening comprehension related to connected discourse, and how these problems may be alleviated via explicit instruction on connected speech. The results of the quasi-experiment supported the contention that given explicit instruction, EFL learners' ability to recognise and comprehend connected speech could be substantially improved. This conclusion was based on the fact that the subjects' perceptions of connected speech problems had significantly decreased following the intervention.

Some pedagogical implications can be drawn from the findings for material developers, syllabus designers, language teachers, and researchers to meet the needs of EFL learners in relation to connected speech. First, many textbook writers have maintained the importance of supra-segmentals to speech intelligibility and comprehensibility. For example, sentence stress has been the most common focus in teaching pronunciation due to the important role it plays in intelligibility. However, other aspects of connected speech (i.e., rhythm, linking, and reductions) are less emphasised in teaching and content coverage, although their importance in the spoken language is huge. Thus, it is recommended that textbook writers strike a balance between suprasegmentals and segmentals in their content coverage. Such focus and attention in the classroom by EFL teachers should also improve learners' listening skills pertaining to connected speech recognition, parsing, and utilisation.

Explicit teacher instruction on various features of connected speech has been established by the present study (and others) as effective in improving EFL learners' micro and macro listening skills. Learners' background knowledge and teachers' use of pictures and keywords were instrumental in helping them recognize connected speech. A bottom-up listening activity was proven effective in helping the learners recognise the division between words. These strategies should be employed by ESL teachers in the classroom to reduce learners' problems in comprehending connected speech.

Moreover, EFL teachers should use a variety of authentic pronunciation tasks to expose learners to actual native-speaker speech and discourse. This exposure will gradually help them to acquire the desired level of listening proficiency. Digital technology in the forms of podcasts, audio clips and video snippets containing native speaker speech can be effectively utilised towards this end. These digital aids provide learners with real-world listening contexts and material and allows them to distinguish between what they believe they are hearing and what is actually being said in the spoken language. Given its potential to improve EFL learners' listening proficiency, connected speech instruction must be further explored in future research, especially when paired with cutting edge digital technology, to determine how it may be impactfully designed and used to improve current classroom practices in EFL.

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