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How're Ya Goin' Mate? The Role of Explicit Instruction on the Development of Phonological Awareness in a Second Language

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One key aspect of speaking a second language is phonological awareness, which involves storing information in the phonological memory and retrieving stored phonological codes from the memory. Connected speech processing enhances phonological awareness in a second language. This quasi-experimental study investigates whether explicit instruction on connected speech components affects phonological awareness of Turkish high school students learning English as a foreign language. To this aim, an experimental group of tenth graders received a 5-week- explicit instruction on four connected speech elements; assimilation, elision, catenation and intrusion, through tailored-made teaching materials whereas a control group of tenth graders in the same school did not receive such instruction. Both groups took a phonological awareness test before and after the treatment. To analyse responses to the phonological awareness test within and between groups, Independent and Paired-samples t-tests were performed using SPSS. The results indicated that explicit instruction in connected speech led to significant improvements in the perception of phonological awareness both within the experimental group and when compared to the control group. The take home message is that integrating pronunciation training through explicit instruction in the high school curriculum could improve perceptions about phonological awareness and connected speech processing as well as pedagogical practices in second language classrooms.

Introduction

It is widely acknowledged in the field of second language (L2) education that the language used in classrooms often differs significantly from everyday language (Brown, 2017).

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The speech forms in electronic media can also vary from one person to another in daily speech (Johnson, 2004) and having high proficiency in a foreign language may not ensure lifelong learning and understanding of the target language (Fouz-Gonzalez, 2017). Despite the growing popularity and investment in foreign language education, Turkish students' spoken English skills remain below expectations (Dağtan & Cabaroğlu, 2021; Kara, Demir-Ayaz & Dündar, 2017). This issue has been attributed to a lack of English use outside the classroom (Kırkgöz, 2007), poor quality of textbooks (Koru & Akesson, 2011), and insufficient training for English teachers at undergraduate level (Demirpolat, 2015). Foreign language teachers who are mostly non-native speakers of English feel inadequate speaking a foreign language (Couper, 2016). In addition, classroom instruction with respect to connected speech components is not based on sound theory and activities are most of the time far from being guiding in practice (Wong, Dealey, Leung & Mok, 2019).

Within the realm of second language learning, researchers have explored the means to build a bridge between pedagogical settings and daily life for authentic language use (e.g., Lai, Shum & Tian, 2016; Hill, Song & West, 2009). Teaching the components of connected speech was one of the means that was resorted to since it increases the effectiveness of communication in the target language (Nokes, 2018). Crystal (2008) defines Connected Speech (CS) as spoken language analysed in continuous series, such as in regular expressions and conversations. Hieke (1987:41) views Connected Speech Processing (CSP) as changes in traditional words that often occur due to forms, spontaneity, randomness and temporal constraints. CSP requires listening and distinguishing the transitions from one word to another in speech sound waves (Field, 2003). Alameen and Levis (2015) divided connected speech into 6 categories, arguing that an individual listening to connected speech compares how words are recorded in memory with how words are represented in real-time flowing speech. Within the scope of this study, four basic elements of CSP, namely assimilation (i.e., changing sounds), elision (i.e., removing sounds), catenation (i.e., linking sounds) and intrusion (i.e., adding sounds), were introduced to the learners. Assimilation, for instance, occurs when a sound is altered due to its adjacent sound(s), which may cause difficulty in especially listening (Burleig, 2011, e.g., 'ten men' sounds like 'tem men'/tɛm mɛn/). Elision is defined as eliminating some of the sounds in natural speech (e.g., 'going to' sounds like 'gonna' /gɒnə/). Catenation refers to the speech rule where two or more sounds of different syllables are merged, which makes the pronunciation of words blend in a way that can cause them to sound like completely different words (e.g., 'an apple' sounds like 'a napple', /ə næpəl/). Intrusion involves adding an extra sound when two vowels are linked (e.g., 'I agree' sounds like 'I jagree', /ɪjəgri/). Intrusive sounds are /j/, /w/ and /r/. Although the discrepancy between connected speech word segments and phonological features is less of a problem for advanced foreign language learners, it can lead to impaired listening perception for lower-level language learners (Gaskell, Hare & Marslen-Wilson, 1995).

An understanding of connected speech components improves phonological awareness (Girard, Floccia & Goslin, 2008), a metalinguistic ability that enables one to make judgements on the sound structure of a language (Mattingly, 1972). Phonological Awareness (PA) embraces the ability to analyse speech sounds and the structure of language, encompassing awareness of words, syllables, and phonemes, as well as sensitivity to onset-rime relationships (Schuele & Boudreau, 2008). It involves the ability to perceive and manipulate the sound system of the language (Goswami & Bryant, 1990). The interplay between PA and CSP in this paper was explored within the framework of the Noticing Hypothesis (Schmidt, 1990; 1995; 2010), which asserts that attention to and saliency of structures facilitates learner awareness, perception and understanding of the segments in listening. One of the preconditions for learning to take place

is to exhibit conscious awareness of the form in the input to convert it into intake. The process of noticing, perceiving and understanding the sound events of deletion, addition and combination such as assimilation, elimination, flapping and vowel weakening can be quite difficult because the boundaries between words and within the same word must be estimated accurately (Ernestus, 2014). Learning a second language occurs when awareness is gradual, focused and supported through teaching (Schmidt, 1990). Izumi (2013) argues that explicit teaching and error correction make learners realise their shortcomings. Therefore, the relationship between explicit pronunciation training and phonological awareness is worth investigating. In addition, the number of studies conducted on the effectiveness of explicit CSP teaching on pronunciation and phonological awareness is quite limited in Türkiye where English is taught as a Foreign Language (EFL). Based on the Noticing Hypothesis, this study attempts to investigate the potential contributions of providing explicit CSP instruction on Turkish EFL highschoolers' phonological awareness. This focus is especially relevant given that the lack of language proficiency and efficiency has been proven to be an issue in Türkiye despite the popularity of foreign language education. After explicit teaching of CS components, we expect an improvement in the perceptions of phonological awareness of Turkish highschoolers learning English as a foreign language.

Research on Connected Speech Processing (CSP)

Learning connected speech processes enables foreign language learners to understand native speaker speech more easily and helps them to communicate more fluently in the target language (Momen & Pilus, 2022). What is more, connected speech processes have been tied to speech perception and reading (Vellutino, Fletcher, Snowling, & Scanlon, 2004) and have been used as one of the indicators to differentiate non-brain damaged patients from those suffering from different neurodegenerative diseases (Ash & Grossman, 2015). Research findings in second language acquisition have reported a positive effect of teaching CSP on pronunciation and speaking skills. Among the very few studies on CSP instruction in the Turkish context, Demirezen (2016) reported that 38 Turkish students with advanced level English had difficulty in hearing, distinguishing and perceiving assimilation in English. However, after three hours of intensive teaching a week, the students showed significant progress in their recognition and use of consonant assimilations. Çimen - Özmert (2019) gave connected speech training to 16 eighth grade students at a private school. While progress was observed in students' phonological awareness, explicit instruction did not improve students' listening skills as expected. The students who received explicit instruction on connected speech elements in the current paper are older and had longer exposure to English.

In another longitudinal study, Ashtiani and Zafarghandi (2015) implemented 18-session CSP training to 40 adult Persian students with intermediate level English. The use of pre-selected English songs had a positive effect on the students' understanding and production of connected speech. Liang (2015) asked 50 Chinese college students studying in the Department of English to read 25 sentences with various sound events. The recorded data revealed that the connected speech use of these students was quite weak and was negatively affected by the native language. In addition, it was found that 28 Chinese students with intermediate level English in Hong Kong improved their understanding of connected speech by being familiar with the CS components of assimilation, junction and elimination, which were given in movie subtitles (Wong, Lin, Wong & Cheung, 2020). Musfirah, Razali and Masna (2019) revealed that teaching connected speech to Indonesian high school students improved their English listening skills. Overall, explicit instruction is cited to improve CSP of L2 learners. Since there is an interdependent

relationship between CSP instruction and phonological awareness, we now turn to a discussion of findings on phonological awareness.

Research on Phonological Awareness (PA)

There is a plethora of research conducted on the effectiveness of explicit pronunciation teaching on phonological awareness (PA) of the learners. Despite the popularity of the research in the field and the acknowledgement of the idea that connected speech rules influence articulation and comprehension, explicit pronunciation teaching is sometimes overlooked because of its 'difficult features' such as stress, tone, intonation and rhythm (O'Brien, 2021). Beginner level students are reported to struggle with pronunciation teaching sessions. Alam and Uddin (2019) found that secondary school students in Bangladesh had very low awareness of accurate L2 English pronunciation, but they had positive attitudes towards improving it via media resources and integration of pronunciation teaching to the curricula. Tejeda and Santos (2014) examined pronunciation, instructional strategies and oral skills in the Mexican context. Beginner level college students agreed that they lacked confidence in pronunciation. Time constraints to practise pronunciation and their struggle to apply pronunciation rules of L2 English burdened the learning process.

Since CSP involves segmenting phonemes in everyday speech, language teachers need to have sufficient PA to build, understand and teach the association between graphemes and phonemes in assisting the reading and listening skills of the learners (Fielding-Barnsley & Purdie 2005; Shankweiler & Fowler 2004). Foreign language teachers may lack training (Derwing & Munro, 2015) or motivation about explicit phonology teaching, and thus, pronunciation practice may only be the implied aim of speaking classes (O'Brien, 2021). As an important factor shaping pedagogical practices in classrooms, phonological awareness of pre- and in-service teachers was investigated in different contexts. Geçkin (2023), for instance, explored the beliefs of preservice English language teachers regarding phonics instruction for young second language learners. Both the group that received instruction on phonics teaching and the control group without such instruction reported to be uncertain about their phonological awareness and acknowledged a lack of skills to do phonics teaching. Six EFL instructors at a Vietnamese university stated that their pronunciation teaching focused on teaching segmental features such as individual sounds, rather than suprasegmental features such as the teaching of rhythm and intonation in speech (Nguyen & Newton, 2021). The instructors added that they rarely taught pronunciation explicitly because of time limitations and the pressures of covering the curriculum, attaching more importance to mutual intelligibility than phonological awareness or native-like fluency.

To have a better understanding of the role of CSP and PA in second language classrooms, research focused on a comparison of phonological awareness and pronunciation capabilities between L2 learners and native speakers. Kivistö-de Souza (2015) compared the phonological awareness of 71 Portuguese L2 learners of English and 19 native English speakers through segmental, suprasegmental and phonotactic tasks. The bilingual group showed lower levels of phonological awareness in English than the monolingual group. The difference shown by the bilingual group was based on the participants' personal evaluations of their pronunciation performance, their experiences in the second language, their language level and language use patterns. The Portuguese learners were given a lexical decision task to measure their phonotactic awareness and a foreign accent rating task to measure their L2 pronunciation accuracy. The results confirmed a positive relationship between phonotactic awareness and L2

pronunciation which improved after intense exposure to the target language (Kivistö-de Souza, 2017). In another study, the perception of phonological awareness, speech intelligibility, and foreign language accents of 34 Iranian learners of English was evaluated by non-native English language teachers (Kochaksaraie & Makiabadi, 2018). There existed a strong relationship between these three variables and the researchers concluded that first language phonology affected intelligibility in the second language.

Phonological awareness instruction is proven to be a strong predictor of reading performance, too. Spanish-speaking kindergarteners are cited to benefit from phonological awareness intervention in English suggesting a need for an integration of phonological awareness in a story reading program (Giambo & McKinney, 2004). Integrating embedded phonological awareness instruction for preschool children with language delays coming from disadvantaged families contributed to an increase in their emergent literacy skills (Ziolkowski & Goldstein, 2008). A focus on syllable differences between native and foreign languages confirmed a positive effect on phonological awareness (Park, 2013).

The relationship between language awareness and connected speech was studied across varying levels of proficiency in a second language (L2). Kennedy and Blanchet (2014) explored the decoding of CSP by 32 L2 French learners in a longitudinal study. Practicing various CSP activities did not contribute to their perception of CSP. Rather, keeping a journal on how to derive meaning from speech proved to accelerate their language awareness. Kennedy and Trofimovich (2010) traced down the development of L2 language awareness of 10 college students over a 13-week pronunciation course. The improvement in students' pronunciation was detected in their weekly journal entries as well as the pronunciation ratings conducted on the first and last weeks of the course. The students are reported to benefit more from listening to fluent L2 speech outside of the class. To the best of our knowledge, not a single study, thus far, has focused on the role of explicit instruction in the development of phonological awareness of high school students in the Turkish context. The need for the current study emerged after carefully considering the interplay between CSP and PA as a predictor to neurodegenerative diseases (Ash & Grossman, 2015) reading difficulties (Vellutino et al., 2004) and teacher pedagogies in second language classrooms (Shankweiler & Fowler 2004).

The current study

Aim and research question

This quasi-experimental study aimed at investigating the potential impact of explicit pronunciation instruction on high school students learning English as a Foreign Language (EFL) in Türkiye. The primary research question addressed was whether explicit pronunciation instruction would lead to significant differences, both within and between groups, in the perceived phonological awareness of 14-15-year-old Turkish EFL learners. Under Schmidt's Noticing Hypothesis (Schmidt, 1990; 1995), the five-week intervention is anticipated to positively influence the students' phonological awareness. That is, the experimental group, which received pronunciation training, is expected to show a statistically significant improvement in their phonological awareness than the control group. However, no significant change in PA was anticipated in the control group, which did not receive such training.

Procedure

After obtaining the necessary permissions from the Turkish Ministry of Education and the University Board of Ethics as well as approval from the students' families and the high school administration, demographic questionnaires and consent forms were distributed to the students. The data collection took place at a public high school which hosted high-achieving students, who ranked in the top 10% based on the nationwide high school placement test scores. First, the students were given an institutional placement test. Those identified as B1-level EFL learners were eligible to take part in the study since low-level foreign language learners might have trouble noticing and perceiving connected speech processes let alone producing them. In addition, the employed materials could be used with upper intermediate level learners of English if the study was to be replicated. The participants were randomly assigned either to the experimental or the control group depending on the class where they received instruction daily. Since the school hosted a homogeneous group of learners, there was no selection bias. Then, the phonological awareness test (Nokes, 2018) was administered as a pre-test. Next, the experimental group underwent five weeks of explicit instruction on connected speech elements, including assimilation, elision, catenation, and intrusion with an additional week dedicated to the fundamentals of phonetics. Upon the completion of the five-week program, the phonological awareness test (PAT) was administered this time as a post-test. The pre- and post-PAT results were entered into SPSS anonymously to examine within- and between-group differences through independent samples and paired samples t-tests conducted on SPSS (version 25.0).

Participants

Participation in the study was entirely voluntary. The participants consisted of 54 tenth grade students studying English as a Foreign Language at a state high school in Türkiye. Of the fifty-four participants, twenty-six were males and twenty-eight were females, with an average age of 15. Twenty-four of the students were assigned to the control group and the rest thirty were assigned to the experimental group through convenience sampling. The students had been studying English for approximately 8 years on average. All the students were native Turkish speakers with no working knowledge of a third language. None of the participants reported any hearing impairments or language difficulties.

Instrument

The PAT (adapted from Nokes, 2018) included twenty-three items which assessed the participants' perceptions of their English pronunciation (See Appendix A). 18 of the items were presented on a Likert scale ranging from 1 to 5 with total possible scores ranging from 18 to 90. For the first 6 questions 1 meant *very poor*, 2 meant *poor*, 3 meant *average*, 4 meant *good* and 5 meant *very good*. For questions 7 and 8, 1 meant *not proficient at all*, 2 meant *not proficient*, 3 meant *average*, 4 meant *proficient* and 5 meant *very proficient*. For the ninth question, 1 meant *not important at all*, 2 meant *not important*, 3 meant *not sure*, 4 meant *important* and 5 meant *very important*. For the items between 10 and 18, 1 meant *not familiar at all*, 2 meant *not familiar*, 3 meant *not sure*, 4 meant *familiar* and 5 meant *very familiar*. The next 4 items (19-22) required yes/no responses and the last item required an open-ended response. All the lesson plans and activities were designed by the authors (See Appendices B & C for examples) and the 5-week intervention was implemented by the first two authors. The instrument was piloted on first-year college students pursuing their undergraduate studies at an English Language Teaching Department at a public university and necessary amendments were made to the developed materials. The validity of the instrument was guaranteed through expert

opinions and piloting feedback. It had high internal reliability (α=.94). The 5-week-pronunciation training program started off with introducing English phonotactics and continued with 4 targeted speech events: assimilation, elision, catenation and intrusion. Explicit instruction was given on each speech event for a week through authentic materials such as songs, poems, puzzles and games. The methodology included explicit teaching of the sound changes through task- based and game-based teaching via offering collaborative and cooperative learning opportunities. The participants were expected to work in groups in most of the tasks, ensuring frequent interaction to facilitate the development of their pronunciation skills. The in-class tasks encouraged the participants to realise how written language differs from speech.

Data analysis

The data was gathered from two different groups; the experimental group which received the intervention and the control group which continued with their regular English curriculum that included no special emphasis on phonology. The data was gathered before and after the teaching sessions. The results of the Shapiro-Wilk test of normality (W = .89, p = .19) and the skewness and kurtosis values between +2 and –2 showed that the data met assumptions of normality. Thus, to investigate between group differences an independent t-test was conducted, and a paired-sample t-test was performed to explore within group differences in perceived phonological awareness. The qualitative data obtained from the scale was analysed through content analysis (Braun & Clarke, 2012) by the first two authors. To ensure reliability, the discrepancies were resolved by the third author. There were no reverse coded items on the Likert scale.

Results

We give an overall and item by item breakdown of responses to PAT before and after the treatment for each group in the table below:

Table 1 *The PAT scores within and between groups*

		Pre-test			Post-test		
Item	group	Mean (SD)	Range	Tendency	Mean (SD)	Range	Tendency
1	Experimental	2.80(.93)	1-5	average	3.13(.94)	1-5	average
	Control	2.88(1.04)	1-5	average	2.96(.81)	1-4	average
2	Experimental	3.37(.96)	1-5	average	3.53(.86)	2-5	good
	Control	3.00(1.10)	1-5	average	3.17(.70)	1-4	average
3**	Experimental	3.57(.94)	1-5	good	3.80(.76)	2-5	good
	Control	3.17(.96)	2-5	average	3.17(.76)	1-4	average
4	Experimental	3.20(.81)	1-5	average	3.17(.70)	2-4	average
	Control	3.08(.88)	1-5	average	2.92(1.14)	1-5	average
5	Experimental	3.53(.82)	1-5	good	3.57(.77)	2-5	good
	Control	3.08(.93)	2-5	average	3.13(1.12)	1-5	average
6	Experimental	3.93(1.02)	2-5	good	4.03(1.10)	2-5	good
	Control	3.42(1.18)	1-5	average	3.63(1.14)	1-5	proficient
7	Experimental	4.30(.75)	3-5	proficient	4.13(.82)	3-5	proficient
	Control	3.88(.99)	2-5	proficient	4.04(.96)	1-5	proficient

8	Experimental	3.97(.81)	3-5	proficient	4.23(.68)	3-5	proficient
	Control	3.54(1.10)	1-5	proficient	4.04(.96)	1-5	proficient
9	Experimental	4.20(.93)	2-5	important	3.77(1.04)	2-5	important
	Control	4.00(.89)	2-5	important	4.12(1.23)	1-5	important
10*	Experimental	3.37(1.13)	1-5	not sure	3.80(1.10)	1-5	familiar
	Control	3.13(1.06)	1-5	not sure	3.17(.96)	1-5	not sure
11	Experimental	2.97(1.25)	1-5	not sure	3.37(1.16)	1-5	not sure
	Control	3.21(1.02)	1-5	not sure	3.08(.83)	1-5	not sure
12	Experimental	3.77(.94)	2-5	familiar	3.87(1.22)	1-5	familiar
	Control	3.17(1.01)	2-5	not sure	3.33(.87)	1-5	not sure
13	Experimental	3.30(1.06)	2-5	not sure	3.57(1.01)	1-5	familiar
	Control	2.88(1.04)	1-5	not sure	2.92(.65)	1-4	not sure
14	Experimental	3.43(1.19)	1-5	not sure	3.67(1.24)	1-5	familiar
	Control	3.04(1.08)	1-5	not sure	3.17(1.01)	1-5	not sure
15**	Experimental	3.23(1.17)	1-5	not sure	3.40(1.13)	1-5	not sure
	Control	2.63(.97)	1-5	not sure	2.79(.83)	1-5	not sure
16**	Experimental	3.80(1.16)	1-5	familiar	4.13(1.07)	1-5	familiar
	Control	3.13(.95)	2-5	not sure	3.42(1.10)	1-5	not sure
17***	Experimental	3.17(1.18)	1-5	not sure	3.60(1.22)	1-5	familiar
	Control	2.71(.96)	1-5	not sure	2.63(.82)	1-4	not sure
18	Experimental	4.30(.95)	2-5	familiar	4.27(1.14)	1-5	familiar
	Control	3.75(1.03)	2-5	familiar	3.75(1.12)	1-5	familiar
Overall	Experimental	63.27(9.88)	44-83	NA	67.03(10.63)	43-84	NA
	Control	57.67(10.89)	43-90	NA	59.42(12.31)	18-80	NA

**p<.05, **p<.01, ***p<.001*

Recall that the responses to the first 18 items of the PAT could range between 18 and 90. Even though both groups were placed in the same level after the placement test, the students in the experimental group evaluated their knowledge of phonological awareness (Mean= 63.27, SD= 9.88) higher than the students in the control group (Mean= 57.67, SD= 10.89) at the onset of the study. Yet, before the implementation of the pronunciation training program, this difference between groups was not statistically meaningful (t(52)=1.96, *p*=.06). The phonological awareness of the control group showed a slight increase (Mean=59.42, SD= 12.31) even though they did not receive instruction on the four elements of connected speech. However, this increase over time was not statistically significant (t(23)=.69, *p*=.50). The group that received explicit instruction, the experimental group, reported an increase in the level of their phonological awareness (Mean= 67.03, SD=10.63), too. The phonological awareness of the experimental group improved significantly after the explicit teaching of the connected speech components (t(29)=2.70, *p*=.011). When the overall scores to the PAT were considered, the experimental group outperformed the control group in their self-reported beliefs on phonological awareness after the 5-week training program (t(52)=2.50, *p*=.021).

When compared to the control group, the increase in the post-PAT mean scores of the experimental group on items 1,2,3,5,6,8,10,11,12,13,14,15,16 and 17 suggested that the intervention had a positive effect. Larger standard deviations showed that some of the participants responded to the intervention differently. The post- test scores of the PAT between the control and the experimental group proved significant improvements on 5 items. The students reported that their listening skills improved significantly after the intervention [See Item 3, $Mean_{control}$= 3.17, $Mean_{exp}$= 3.80, (t(52)=3.04, *p*=.004)]. Familiarity with English word

stress [See Item 10, $Mean_{control}$= 3.17, $Mean_{exp}$= 3.80, (t(52)=2.26, *p*=.028)], intrusion [See Item 15, $Mean_{control}$= 2.79, $Mean_{exp}$= 3.40, (t(52)=2.27, *p*=.027)], assimilation [See Item 16, $Mean_{control}$= 3.42, $Mean_{exp}$= 4.13, (t(52)=2.40, *p*=.020)] and catenation [See Item 17, $Mean_{control}$= 2.63, $Mean_{exp}$= 3.60, (t(29)=3.50, *p*=.001)] increased significantly in the experimental group.

The students within the experimental group reported that they had become more confident in their approach to using technology to learn connected speech [See Item 8, $Mean_{pre}$= 3.97, $Mean_{post}$= 4.23, (t(29)=1.98, *p*=.05)] and there was a meaningful decrease in the importance the students attached to learning English connected speech components after the training [See Item 9, $Mean_{pre}$=4.20, $Mean_{post}$= 3.77, (t(29)=2.21, *p*=.035)]. Although both groups attached great importance to learning English connected speech (See item 9), the reason why the experimental group viewed learning connected speech less important than the control group could be related to the effectiveness of the explicit instruction given. In addition, both groups reported that they were very much familiar with contracted forms in English (See item 18). This could be because of the heavy emphasis on contractions presented in the textbooks. Next, we report the responses to yes/no questions in the following table:

Table 2 *Yes Responses for questions 19-22 across groups*

Item	Group	Pre-test N (%)	Post-test N(%)
19 Were you taught English pronunciation in the classroom?	Experimental	23(77%)	26(87%)
	Control	20(83%)	21(88%)
20 Were you taught English connected speech in the classroom?	Experimental	22 (73%)	26(87%)
	Control	22(92%)	18(75%)
21 Do the listening exercises that are used in class involve samples of English speakers using connected speech?	Experimental	25(83%)	26(87%)
	Control	21(88%)	20(83%)
22 Do the speaking exercises that are used in class involve speaking English using connected speech?	Experimental	20(67%)	26(87%)
	Control	22(73%)	20(83%)

As given in Table 2, the experimental group showed a steady increase in their responses to connected speech instruction and learning unlike the control group whose answers were not consistent over time. The responses of the experimental group could be taken as means to evaluate the 5-week-pronunciation training program. The last question inquired out of school learning environments of connected speech in L2 English. See Table 3:

Table 3 *Sources of learning environments of CS*

Sources	Group	Pre-test N (%)	Post-test N (%)
Nowhere	Experimental	13(43%)	11(37%)
	Control	13(54%)	13(54%)
Communicating with others	Experimental	8(27%)	4(13%)
	Control	2(8%)	1(4%)
In-class activities	Experimental	5(17%)	11(37%)
	Control	8(34%)	8(34%)
Internet use	Experimental	4(13%)	4(13%)
	Control	1(4%)	2(8%)

Four sources emerged when the responses of both groups were thematically analysed. Not much change was observed within the control group. Yet, the experimental group reported an increase (17% vs. 37%) in learning CS through in-class activities.

Discussion

This study was concerned with the effect of explicit pronunciation teaching on high schoolers' phonological awareness. Although a change in the pronunciation of adult L2 speakers rarely takes place (Kennedy, 2008), the adolescents in this study confirmed the role of explicit instruction of CS components in improving their phonological awareness. In general, pronunciation teaching was reported to be unplanned and without systematic error correction (Foote, Trofimovich, Collins & Urzúa, 2016). However, our findings support previous research indicating that structured explicit instruction on connected speech rules, such as assimilation, elision, catenation, and intrusion, had a positive impact on students' perceived ability to comprehend and produce English in a more native - like manner (Nokes, 2018). Although perception of certain speech processes such as catenation, assimilation, intrusion and word stress (See items 10, 15,16 and 17) is reported to improve in the experimental group after the intervention, the importance attached to the learning of connected speech decreased in the same group. The former difference could be explained through raised consciousness about phonological awareness thanks to the designed training program whereas the latter difference could be linked to the learners' increased confidence and motivation in the perception and production of connected speech components.

The findings also align with Schmidt's Noticing Hypothesis in that the learners in the experimental group reported higher levels of familiarity with the speech rules after the treatment. Despite the brief duration of instruction, the students became more aware of the rules of assimilation, elision, catenation and intrusion thanks to the saliency provided through the teaching material. Accordingly, the outcomes of this intervention may be interpreted as potentially beneficial since the incorporation of explicit teaching resulted in increased awareness in the perception of speech flow in English. The improved awareness of these sound events could help learners to integrate them into their pronunciation. The findings also suggest that the students engaged in learning pronunciation patterns through interacting with others and exploring on the Internet. This tendency provides evidence for incidental learning, which takes place without intentional goals (Schmidt, 2010). Besides gaining awareness, second language learners in this study attained the ability to analyse, compare and test their hypotheses to segment speech in streaming linguistic input (Schmidt, 1990). Thus, a deeper learning at the level of understanding was achieved thanks to the focal attention given to transfer input into intake (Schmidt, 1993). The meaning - and form - based activities delivered in this paper highlight the role of planned explicit teaching and learning of connected speech processes in promoting external and teacher-centred pedagogies to internal and learner-centred learning experiences.

The study highlights a significant gap in the Turkish EFL classrooms stemming from the lack of exposure to authentic English use in and outside of the classroom. Adding pronunciation guidelines to textbooks could help improve the phonological awareness of L2 learners (Nguyen & Newton, 2021). Similar to the findings of Diaz (2017), the expectation is that the short amount of explicit instruction could improve the intelligibility of the learners by minimising first language transfer effects. The study provides meaningful insights in terms of how such programs may be implemented in English teaching programs with the use of gamification and

technology which allow the students to explore content at their own pace. The use of technology and gamification in learning speech events facilitates immediate feedback, motivation, self-esteem, risk-taking and participation without overwhelming levels of foreign language anxiety.

Conclusions and implications

The study offers implications for second language classroom research and teaching pedagogy. One way to improve phonological awareness is to expose the L2 learners to fluent target speech, which can enhance auditory comprehension (Underbakke, 1993; Romanini, 2008) especially when the learners spare time to listen to fluent native pronunciation outside classrooms (Wennerstrom, 1992). Many language teachers overlook pronunciation teaching either because they see it as a difficult task (O'Brien, 2021) or they are not confident about where to start and what aspect of speech processing to focus on (Nakashima, 2006). For this reason, pre-service as well as in-service foreign language teachers should be given workshops to be reminded about the role of PA in L2 listening, speaking and reading. Activities that would trigger real-life speech are more helpful than traditional drilling exercises (Gilakjani, 2011) and incorporating prosody training in planned teaching materials could improve the speaking of L2 learners (Levis, 2001).

Some of the limitations of the study need to be articulated. First, the small sample size of the students and the short intervention period make it difficult to generalize the findings. Second, activities conducted in this study were mostly based on collaborative learning in pairs and groups. To encourage autonomous learning more individual activities could be added for future pedagogical practices. If the current study is to be replicated, the same materials could be used on a larger group of Turkish students or students that come from phonologically different first languages to investigate the improvement of PA of teen learners. For further research, in addition to the CS elements, the teaching of both segmental and suprasegmental features on PA could be explored.

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Appendix A: Phonological Awareness Test (adapted from Nokes, 2018).

Item Number	Item	Response Type
1	How would you rate your English-Speaking skills?	Likert Scale
2	How would you rate your English-pronunciation skills?	Likert Scale
3	How would you rate your English-listening skills?	Likert Scale
4	How would you rate your classmates' English-Speaking skills?	Likert Scale
5	How would you rate your classmates' English-Listening skills?	Likert Scale
6	How would you rate your instructors' English-Pronunciation skills?	Likert Scale
7	How do you feel about using technology to learn English pronunciation?	Likert Scale
8	How do you feel about using technology to learn English connected speech?	Likert Scale
9	How important do you think it is to learn English connected speech (i.e. how do speakers of English actually talk)?	Likert Scale
10	How familiar are you with English word stress? [Examples: "Hello (he-LOH)" / "Goodbye (good-BAYH)" / "Welcome (WEL-kuhm)"]	Likert Scale
11	How familiar are you with English-sentence stress and timing? [Examples: "ONE and TWO and THREE and FOUR" = "ONE and a TWO and a THREE and a FOUR"]	Likert Scale
12	How familiar are you with English-reduction? [Examples: Going to (gonna) / Want to (wanna) / Have to (hafta)]	Likert Scale
13	How familiar are you with English-citation vs. weak forms? [Examples: "Can I have some of that?" vs. "Can I have summa / some uv that?"]	Likert Scale
14	How familiar are you with English-elision? [Examples: Camera vs. /kæmra/, Probably vs. /ˈprɒbli/, About vs. /baut/]	Likert Scale
15	How familiar are you with English intrusion? [Examples: Triangle vs. tri-/j/angle, Lower vs. low-/w/er, Something vs. some/p/-thing]	Likert Scale
16	How familiar are you with English-assimilation? [Examples: Don't you (dontchu) / Did you (didju) / Won't you (wonchu)]	Likert Scale
17	How familiar are you with English-catenation? [Examples: Top person (to-person) / Left arm (lef-tarm) / Nitrate vs. night-rate]	Likert Scale
18	How familiar are you with English-contraction? [Examples: Will not (won't) / Cannot (can't) / Have not (haven't)]	Likert Scale
19	Were you taught English pronunciation in the classroom?	Yes/No Response

20	Were you taught English connected speech in the classroom?	Yes/No Response
21	Do the listening exercises that are used in class involve samples of English speakers using connected speech?	Yes/No Response
22	Do the speaking exercises that are used in class involve speaking English using connected speech?	Yes/No Response
23	If you learned about English connected speech outside the classroom, where did you?	Open Ended Response

Appendix B: Sample materials used in the first week

Instructions: Shuffle the cards. Lay the written face of the cards on the desk. Match the words with their transcriptions.

/bʊk/	/reɪn/	/fɪʃ/	/frɛnd/	/hoʊm/
/kʊk/	/sɪŋ/	/hɛlp/	/rid/	/ˈmɔrnɪŋ/
/farm/	/treɪn/	/ˈmʌni/	/ˈsɪstər/	/ʃuz/
/ʤʌmp/	/bɜrd/	/ˈwɪntər/	/kar/	/ˈwɔtər/
/lʌnʧ/	/dɔg/	/ʧɛr/	/drɪŋk/	/æt/

Book	Rain	Fish	Friend	Home
Cook	Sing	Help	Read	Morning
Farm	Train	Money	Sister	Shoes
Jump	Bird	Winter	Car	Water
Lunch	Dog	Chair	Drink	Eat

Appendix C: Sample materials used to teach intrusion

Instructions: The sentences below include examples of intrusion. Read the sentences and highlight the intrusive sounds (e.g., /r/- /w/-/j/) in the sentence.

1. You are a thief of joy.	**1. You/w/are**/a/thief/of joy. **(/w/)**
2. He is a competitive person.	**2. He/j/is**/a/competitive/person. **(/j/)**
3. She said that the test was too easy.	3. She/said that/ the test was/**too/w/easy. (/w/)**
4. We saw a movie last/night.	4. We/**saw/r/a** movie/ last/night. **(/r/)**
5. Just do it with courage.	5. Just/**do/w/it**/with/courage**. (/w/)**
6. The media are to blame.	6. The/**media/r/are**/to/blame. **(/r/)**
7. They allowed not wearing uniforms.	7. **They/j/allowed**/not/wearing/uniforms. **(/j/)**
8. That is so amazing Jules!	8. That/is/**so/w/amazing/Jules! (/w/)**

Declarations:

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Informed Consent: *The informed consent of the participants and their parents were taken.*

Data availability: *The data is available upon request.*