The improvement of Spanish/Catalan EFL students' prosody by means of explicit rhythm instruction

Leticia Quesada Vázquez[1], Joaquín Romero[2]

[1]Rovira i Virgili University, Spain, [2]Rovira i Virgili University, Spain,
[1]*leticia.quesada@urv.cat*, [2]*joaquin.romero@urv.cat*

Abstract

Language rhythm is a suprasegmental feature whose teaching within the EFL classroom can help students improve their L2 global prosody. This paper documents a longitudinal study conducted with ESP students at Rovira i Virgili University (Tarragona, Spain). Two groups were established: the experimental group, which received explicit rhythm instruction, and the control group, which did not. Both groups participated in ten weekly pronunciation sessions following Celce-Murcia's communicative framework and adapted to the technical context of the course. This study investigates the extent to which rhythm training positively influences students' prosody by analyzing ten sentences uttered before and after the instruction and measuring their VarcoV values. Results show that the experimental group tends to increase their VarcoV values after training, adopting a more English-like rhythm, while the control group behaves incongruently. Despite ANOVAs and t-tests not always being significant, the effect sizes of the differences between pre- and post-instruction reach significance.

Keywords: ESL (English as a Second Language), EFL (English as a Foreign Language), pronunciation instruction, rhythm, Varco-V (coefficient of variability in duration of a certain speech interval)

1. Introduction

Rhythm is a suprasegmental feature in the foundations of language that establishes the basis of speech and anticipates syntactic and lexical information [1]. As one of the main organizers of speech, its command becomes key to ease comprehension and consequently avoid misunderstandings and communication breakdowns that go beyond the meaning of isolated words [2]. In fact, some researchers have artificially manipulated durational patterns of L2 speech in order to make them similar to those found in the target language, and showed that the more alike these are, the more intelligible the speech is [3, 4]. Rhythmic organizational patterns create an acoustic illusion towards isochrony that directly affects intelligibility, comprehensibility and fluency when speaking a second language, thus influencing both production and perception [5, 6, 7]. Consequently, when two languages differ remarkably in terms of rhythm, it is easy for misinterpretations to arise. English and Spanish have been placed at the extremes of the rhythm continuum. Spanish and Catalan are syllable-timed languages, hence organizing information by means of similar syllable duration. English, on the other hand, is a stress-timed language, so its rhythm is based on a similar duration of interstress intervals, marked by two types of syllables differing in length (i.e. stressed and unstressed) [8, 9, 10]. Therefore, Spanish/Catalan students of English, who generally ignore the existence of language rhythm, tend to adapt their mother tongue rhythm when speaking the L2, leading to problems in pausing, fluency and comprehensibility.

For this reason, several studies have attempted to find evidence to prove that the introduction of rhythm instruction within the English L2 class could help learners to improve their prosodic skills. Chela Flores taught word-decontextualized rhythmic patterns to Spanish students at the university of Venezuela for a semester obtaining remarkable improvement in students' speech both in perception and recognition under controlled circumstances [11]. Hahn proved the effectiveness of correctly placing primary stress in international teaching assistants' speeches, by creating three different versions of the same speech where primary stress was correctly placed, incorrectly placed, or omitted. Results showed that speeches where stress had been correctly placed were more understandable and intelligible [12]. Tsiartioni established an experimental group that received rhythm instruction and a control group that did not for three different age groups (6, 12, and 16 years old). After measuring vocalic and consonant pairwise variability index (PVI) values, results revealed that the experimental group's rhythm improved while the

control group's remain the same [13]. Along these lines, the present study wants to prove the effectiveness of explicit rhythm instruction on Spanish/Catalan EFL learners so as to improve their English prosody. For this purpose, the following hypotheses are formulated:

1. Students' L1 negative transfer [14] will decrease more when receiving explicit rhythm instruction.
2. By applying Celce-Murcia's steps to teach communicatively [14] within pronunciation instruction students will improve their L2 global prosody.
3. Students receiving explicit rhythm instruction will become more comprehensible and fluent in English.

2. Method

A pronunciation module was designed and included into an existing B2 technical English course taking place from February to May 2017 at Rovira i Virgili University. The module consisted of ten weekly sessions of thirty minutes held within the class schedule, and the participants were 298 Spanish/Catalan first-year undergraduate engineering students randomly divided into three experimental groups and three control groups according to their discipline schedules and own time preferences. Sessions were designed according to course contents and previous observations, matching students' needs [15]. In fact, rhythm was considered a suitable feature to be taught due to noticeable students' problems when speaking aloud in terms of fluency and comprehensibility. In addition, each session was further outlined following Celce-Murcia's steps to teach communicatively [14]. Experimental groups received explicit rhythm instruction while control groups did not. This study belongs to a broader research project and focuses on the analysis of ten sentences recorded before and after training and compared by measuring their VarcoV values.

2.1. Participants

Owing to the longitudinal nature of the study, only those students who attended at least 90% of the sessions were considered as subjects. An effort to control attendance was made by counting recordings as part of the final grade, including the sessions within regular lectures and emphasizing the importance of working on their pronunciation for their final presentation. Unfortunately, absenteeism could not be fully controlled since attendance at Spanish universities is optional. Consequently, the number of participants in this experiment dropped to 42, 21 from the experimental groups and 21 from the control groups. Table 1 summarizes the profiles of those participants:

Table 1: Participants profiles.

	AGE		MOTHER TONGUE			ENGLISH LEVEL		
	18	18+	Sp/Cat	Sp	Other	A2-B1	B1-B2	B2-C1
Exp	21	0	20	1	0	10	6	5
Con	16	5	17	1	3	4	11	6

Most of the subjects were Spanish/Catalan bilinguals aged between 18 and 20 years old. Some of them were balanced bilinguals but there were others who were dominant in one of the two languages. However, all the participants pursued primary and secondary education in Catalonia, so they had studied and acquired both languages. The highest range of variability was found in their English level, an issue that will be further examined when discussing the results.

2.2. Procedure

The module was designed in relation to the course content: materials and activities were adapted within the technical framework of the course and took into account the students' linguistics notions. Therefore, the vocabulary and grammar used should have been previously taught in regular lectures to ensure students' familiarity. Materials were either adapted from existing pronunciation sources [16, 17, 18, 19, 20] or created from scratch using videos, images and podcasts available.

The module was organized according to the complexity of the speech units, progressively increasing difficulty. The first sessions were focused on the word level, working on pronunciation issues related to the regular past tense, derivational morphemes and compound nouns. At this level, those receiving explicit rhythm instruction learned about word stress and syllable length; then, students worked on pronunciation at a sentence level by means of process and graph description. At this point, the experimental group was introduced to thought groups and the difference in stress between content and function words. Finally, the last sessions were dedicated to practicing different speeches, such as talks and debates. Students taking explicit rhythm training got to know about and practiced connected speech issues like pausing, linking and sentence focus while reviewing the rhythmic features already seen in class.

On the other hand, sessions followed Celce-Murcia's steps to teach communicatively [14] in order to ensure a communicative framework. Thus, all the sessions started with a description of the feature to practice using a wide range of auditory, tactile and kinesthetic activities. Next, students listened to the feature by means of videos and audio

files so as to make sure they were familiar with it and they could distinguish it. Finally, they practiced it progressively, starting with controlled situations such as reading aloud and "listen and repeat" activities, continuing with guided practice by means of gap exercises and guessing games, and finishing with communicative activities like group/pair discussion or picture narratives. As mentioned before, the difference between groups was explicit rhythm instruction. Hence, the sessions were the same for both groups except for the variations that explicit rhythm training implied. For example, when doing "listen and repeat" activities, the experimental group had to clap on stressed syllables and bear in mind that they had to pause only after thought groups.

Students had to take a test one week before (pre-test) and after (post-test) the instruction. They recorded themselves individually in three isolated rooms at the university library, using two Sony PCM-MIO and a Zoom Hynsp recorders. They had to read ten sentences and a text aloud, introduce themselves specifying name, place of birth, age, language background and engineering discipline, and give their opinion on social media. As it has previously been pointed out, this study focuses on the analysis and comparison of the pre- and post-test sentences. These were created to represent a broad range of sentence structure and use technical vocabulary that students had to learn during the course. Regarding rhythm, no rhythmic cues such as syllable structure were considered when creating the sentences.

2.3. Data analysis

The program PRAAT [21] was used to segment the sentences, following Ordin & Polyanskaya's criteria [22, 23]. The clusters of vocalic and consonant intervals within the sentence were identified and delimitated. Neither filled nor unfilled pauses were counted when measuring rhythm. Ordin & Polyanskaya's script [23] was run to calculate VarcoV values. White & Mattys defined VarcoV as "the standard deviation of vocalic interval duration divided by mean vocalic duration, multiplied by 100 [24]". The decision to use this rhythmic measure in particular was based on their studies proving its effectiveness to measure language rhythm within second language acquisition [24, 25]. It must also be highlighted that higher VarcoV values have been observed in English compared to Spanish and Catalan [26]. Consequently, this study examines whether VarcoV values increase after treatment and whether the instruction received makes a difference in the results.

2.4. Statistical analysis

The data were analyzed using mixed repeated measures ANOVAS and t-tests. First, we studied the general impact on learner's prosody by running a mixed ANOVA with time (before and after instruction) and sentence as within-subjects factors, and group (experimental or control) as a between-subjects factor: VarcoV values were the dependent variable. Second, we wanted to examine the importance of the difference in production before and after treatment. Therefore, another mixed ANOVA was carried out with the difference between each sentence performance before and after training as the dependent variable, sentence as the within-subjects factor and group as the between-subjects factor. Third, four t-tests were performed for each sentence in order to analyze the magnitude of the difference depending on the instruction received: two paired-samples t-tests that compared the groups' learning process, and two-independent-samples t-tests comparing the initial and final performance of the two groups. Finally, one more independent-samples t-test was run which compared the two groups' effect sizes for all the sentences. The alpha value was always set at .05.

3. Results

As displayed in Table II, the control group's means of VarcoV values increase in half of the sentences while the experimental groups' numbers rise in eight out of the ten sentences (bold numbers). Hence, an initial positive influence of explicit rhythm instruction is perceived:

Table 2: VarcoV values before and after instruction.

Control group – Varco-V means										
Test	Sentence									
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Pre	0,37	0,40	0,39	0,54	**0,45**	**0,48**	0,55	0,42	0,49	0,48
Post	0,36	0,40	0,38	0,52	**0,47**	**0,49**	0,53	0,43	0,51	0,52
Experimental group – Varco-V means										
Pre	**0,39**	**0,38**	**0,38**	**0,50**	0,41	0,45	**0,53**	0,41	0,52	**0,48**
Post	**0,40**	**0,39**	**0,39**	**0,51**	0,50	0,45	**0,56**	0,43	0,48	**0,51**

The distribution of values is normal for each group despite the fact that it varies considerably depending on the person and the sentence. As mentioned above, in order to determine the degree of impact that instruction made, a mixed repeated measures ANOVA was run with time and sentence as within-subjects factors and group as a between-subjects factor. Results show no significance for either time $F(1,40) = 2.006$, $p = .164$, or group $F(1,40) = .267$, $p = .608$, but it does for sentence, $F(9,32) = 29.172$, $p = .01$. However, the

time*sentence interaction shows a non-significant result, $F(9,32) = 1.185$, $p = .313$. Nevertheless, Figure 1 reveals that the experimental group values increased sharply while the control group ones remained almost stable. Besides, despite the considerable difference in values before treatment, possibly related to a higher initial level of the control students and, hence, a better command of L2 rhythm, the experimental group outperformed the control group at the end of the course, showing a higher degree of improvement:
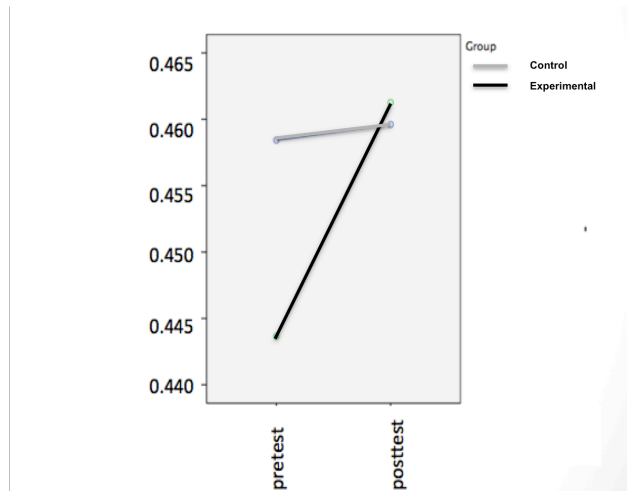
Figure 1: VarcoV progress before and after instruction.

Examining individual figures, we observed that, in the experimental group, more than 50% of the class increased their VarcoV values in seven out of ten of the sentence, while in the control group, that only happened with four of them. Regarding level, we observed no clear pattern of behavior: the number of sentences with an increase in VarcoV values after training tends to be higher for the experimental groups independently of their initial level. Hence, as shown in Figure 2, their level of English at the beginning of the course (L1: beginner/low-intermediate, L2: intermediate, and L3: upper-intermediate/advanced) does not seem to influence improvement:
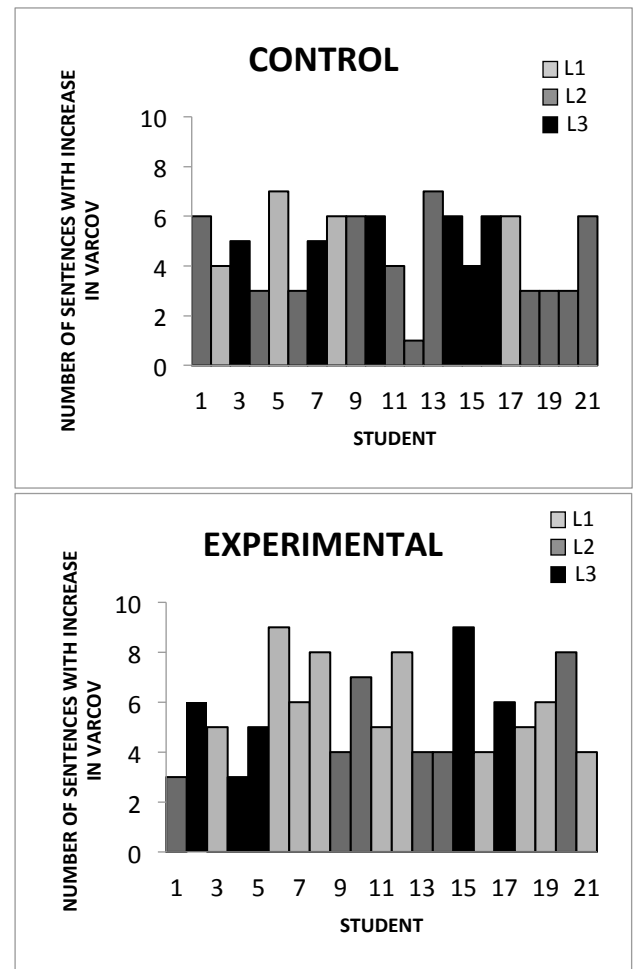

Figure 2: Experimental and control groups' VarcoV progress per student by initial English levels.

However, when we focus on each of the six groups, we observe that, in group three (part of the control group), students improved to the same extent despite having different levels of English, while in the rest of the groups improvement considerably varies depending on the person. This group was the one with the least number of students, only twelve, while the rest had more than thirty (see Figure 3). As a consequence, sessions were easier to monitor and individual feedback could be better guaranteed. Therefore, reduced groups seem to positively influence instruction in general, but further research should be conducted in order to explore this possibility.
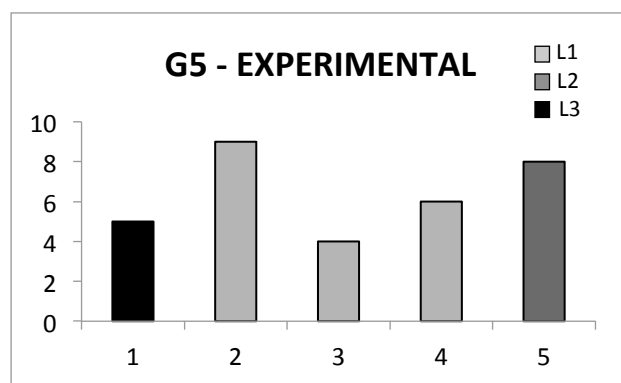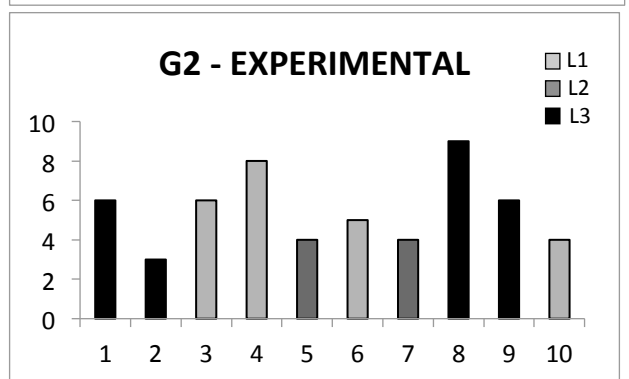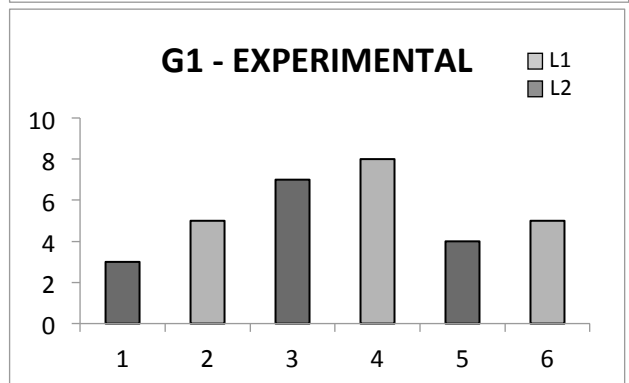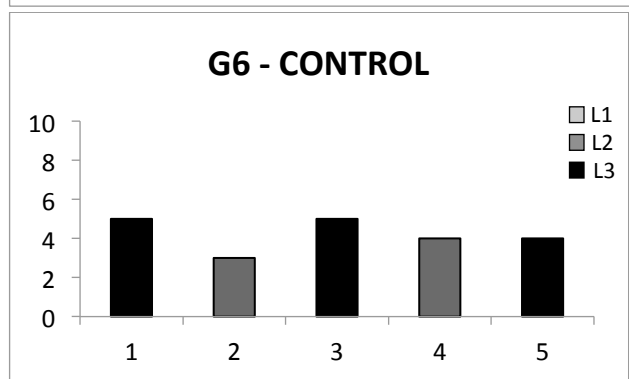
G3 - CONTROL

G4 - CONTROL

G6 - CONTROL

G1 - EXPERIMENTAL

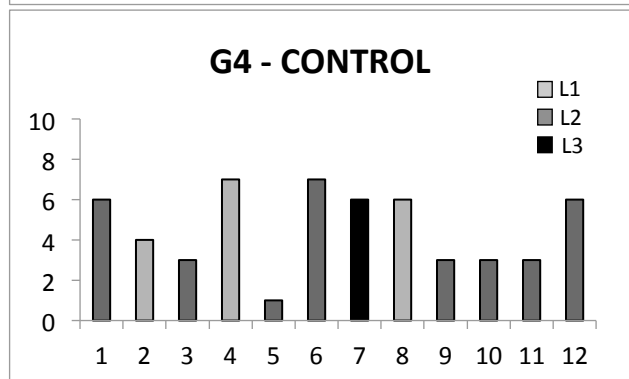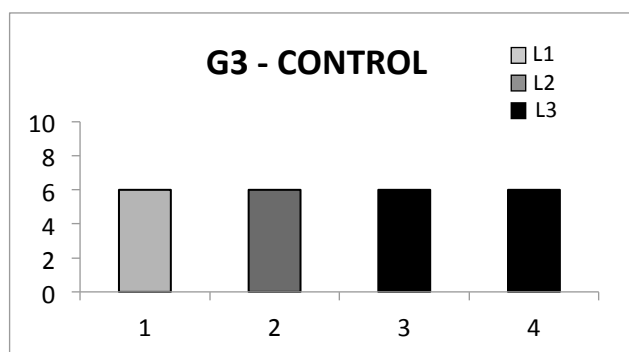**G2 - EXPERIMENTAL**

G5 - EXPERIMENTAL

Figure 3: Individual groups' VarcoV progress per student by intial English levels.

In order to test the differences between values before and after training depending on the treatment received, the second mixed ANOVA was run. The difference between the Varco-V values before and after the instruction were the dependent variable, sentence was the within-subjects factor and group the between-subjects factor. Results show no significance for either group, $F(1,40) = 1.532$, $p = .223$, or sentence, $F(9,32) = 1.185$, $p = .313$.

T-tests were performed, then, so as to check for variations within each sentence. Four t-tests were run per sentence: two paired-samples t-tests comparing each group and two independent-samples t-tests comparing both groups before and after instruction. Both the t-tests ($p>.05$) and the corresponding effect sizes ($d<2$) were found non-significant. Nevertheless, there was a discernible difference between the experimental and the control group effect sizes when examining paired-samples t-tests. The experimental group shows a tendency towards a positive difference and this tends to be higher than the one found for the control group, which tends to show small positive differences and bigger negative ones (see Figure 4):
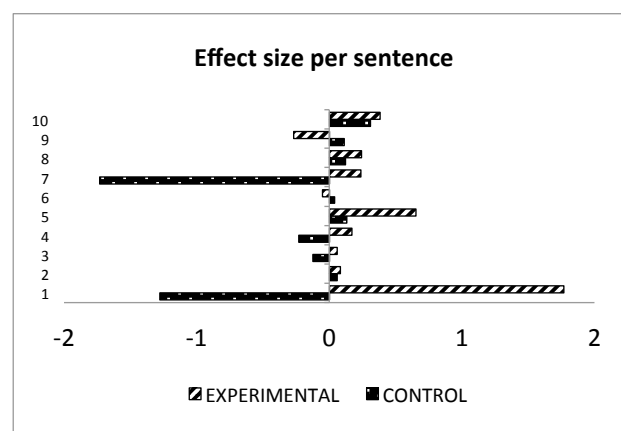

Figure 4: Effect size of the VarcoV difference per sentence before and after instruction.

For this reason, one more independent-sample t-test was carried out to analyze the relevance of the

effect size. This time, results show significance $T(18) = -2102$, $p = .05$. Although findings reveal that VarcoV values tend to increase when rhythm is explicitly taught, more research is needed to reach conclusive results.

4. Discussion

This study focuses on the effectiveness of explicit rhythm instruction to improve Spanish/Catalan EFL students' prosody. Rhythm instruction is proven to increase students' VarcoV values, consequently approaching English rhythm. The difference before and after the instruction is higher and more consistent for the experimental group than for the control group, which does not always show improvement and this tends to be lower. Therefore, L1 negative transfer is mitigated by means of explicit rhythm instruction (hypothesis 1). On the other hand, the fact that both groups show improvement suggests that teaching pronunciation within a communicative framework such as the one proposed by Celce-Murcia is beneficial for students' prosody (Hypothesis 2). As a consequence, these findings also suggest that learners who benefited from explicit rhythm instruction are more comprehensible and fluent (Hypothesis 3). However, a lack of strong statistical significance calls for further research. Despite the fact that initial English level seems not to affect students' performance after treatment, other external factors such as overcrowded classes, absenteeism, motivation or attitude could play a role in their progression. Besides, the results are obtained from a controlled situation. Therefore, it would be recommended to correlate to extemporaneous performances so as to examine the influence of rhythm instruction for communicative purposes in depth.

5. Acknowledgements

6. References

[1] Derwing, T.M., Munro, M.J. 2015. *Pronunciation Fundamentals. Evidence-based Perspectives for L2 Teaching and Research.* Amsterdam: John Benjamins.

[2] Gilbert, J.B. 2008 *Teaching Pronunciation: Using the Prosody Pyramid.* New York: Cambridge university Press, 1.

[3] Tajima, K., Port R., Dalby, J. 1997. The effects of temporal correction on intelligibility of foreign-accented English. *Journal of Phonetics*, 25, 1-24.

[4] Quene, H., Van Delft, L.E. 2010. Non-native durational patterns decrease speech intelligibility. *Speech Communication*, 52, 911-918.

[5] Lehiste, I. 1977. Isochrony reconsidered. *Journal of Phonetics* 5, 253-263.

[6] Finch D.F., Ortiz Lira H. 1982. A Course in English Phonetics for Spanish Speakers. Bristol: Heinemann Educational Books Ltd., 113.

[7] Dauer, R.M. 1983, Stress-timing and syllable-timing reanalyzed. *Journal of Phonetics*, 11, 52.

[8] Lloyd James, A. 1940. *Specch Signals in Telephony.* London: Pitman & Sons.

[9] Pike, K.L. 1972 [1945]. The intonation of American English. *Intonation*, D. Bolinger (Ed.). Harmondsworth: Penguin 53-83.

[10] Abercrombie, D. 1967. *Elements of General Phonetics.* Edinburgh: Edinburgh University Press.

[11] Chela Flores, B. 1997. Rhythmic patterns as basic units in pronunciation teaching. *Onomázein* 2, 111-134.

[12] Hahn, L. 2004. Primary stress and intelligibility: research to motivate the reading of suprasegmentals. *TESOL Quarterly, 38* (2), 201-223.

[13] Tsiartsioni, E. 2011. Can pronunciation be taught? Teaching English speech rhythm to Greek students. In Eliza Kitis, Nikolas Lavidas, Nina Tpointzi and Tasos Tsangalidis (eds.), *Selected papers from the 19th International Symposium on Theoretical and Applied Linguistics (ISTAL 19),* 447-458.

[14] Celce-Murcia, M., Brinton, D.M., Goodwin, J.M. 1996. *Teaching Pronunciation: A Reference for Teachers of English to Speakers of Other Languages.* New York: Cambridge University Press., 36.

[15] Basturken, H. 2010. *Developing Courses in English for Specific Purposes.* London: Palgrave Macmillan, 19.

[16] Chela de Rodríguez, B. 1976. Teaching English suprasegmentals to Spanish speakers. *Kansas Working Papers in Linguistics*, 1, 63-82.

[17] Beisbier, B. 1994. *Sounds Great 1: Low Intermediate Pronunciation for Speakers of English.* Boston, MA: Heinle & Heinle.

[18] Gilbert, J.B. 2005. *Clear Speech: Pronunciation and Listening Comprehension inNorth American English, Student's Resource Book (3rd Ed.).* Cambridge, UK: Cambridge University Press.

[19] Gilbert, J.B. 2005. *Clear Speech: Pronunciation and Listening Comprehension inNorth American English, Teacher's Resource Book (3rd Ed.).* Cambridge, UK: Cambridge University Press.

[20] Freire, R., Jones, T., Lawson L., Earle-Carlin, S. 2010. *Q Skills for Success: Listening and Speaking.* New York: NY: Oxford University Press.

[21] PRAAT. *http://www.praat.org*

[22] Ordin, M., Polyanskaya, L. 2014. Development of timing patterns in first and second language. *System 42*, 244-257.

[23] Ordin, M., Polyanskaya, L. 2015. Acquisition of speech rhythm in a second language by learners with rythmically different native language. *The journal of Acoustic Society in America 138* (2), 533-544.

[24] White, L., Mattys, S. 2007a. Calibrating rhythm: first language and second language studies. *Journal of Phonetics 35*(4), 501–522.

[25] White, L., Mattys, S. 2007b. Rhythmic typology and variation in first and second languages. In Prieto, P., Mascaró, J. & Solé, M.J. (Eds.), *Segmental and prosodic issues in romance phonology.* Amsterdam: John Benjamins, 237- 257.

[26] Prieto, P.,Vanrell, M del Mar, Astruc, L., Payne E., Post, B. 2012. Phonotactic and phrasal properties of speech rhythm. Evidence from Catalan, English and Spanish. *Speech Communication 54,* 681-702.