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The Effect of Teaching Formulaic Sequences through Spaced and Non-spaced Retrievals on Iranian EFL Learners' Oral Fluency*

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Abstract

Formulaic sequences (FSs) are among the most commonly discussed and well-documented effective factors in oral fluency both in L1 and L2. The present study aims to investigate the effect of teaching a set of 140 FSs on Iranian EFL learners' oral fluency. The relationship between the use of FSs and different measures of oral fluency is also studied empirically. Forty-eight intermediate EFL learners took part in the study. The participants were randomly assigned into two experimental groups and one control group. One of the experimental groups was taught the FSs with spaced retrievals. The other experimental group was also taught the FSs but with non-spaced retrievals. The control group was taught no FSs. The posttest was conducted one week after the treatment. Multivariate analysis of variance (MANOVA) and other statistical procedures were used for analyzing the data. The results indicated that spaced productive retrieval of the FSs after their explicit and holistic teaching, helped the learners to have longer mean length of runs. The present findings have important implications for solving students' problems in speaking the second language. Therefore, the significance of spaced retrieval of FSs in language teaching and learning should not be neglected.

Key Words: Spaced retrieval, formulaic sequence (FS), oral fluency

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Introduction

Todays, speaking is widely considered to be the most important and also the most difficult skill in a second or foreign language learning. As Richards (2008) states, students rate their success in English language course as well as the effectiveness of the course based on the ability and the quality of their spoken language proficiency. Fluency is increasingly set to become a vital factor in person's overall spoken language proficiency (Bosker, Pinget, Quené, Sanders, & De Jong, 2012). Searching for the effective methods of teaching oral skills has been the focus of methodological debate (Richards, 2008). In the last decade there has been a growing interest in the positive effect of using formulaic word strings on proficiency in speech (e.g., Boers at al., 2006; Boers at al., 2014).

Although based on theories such as Idiom Principle (Sinclair, 1991), holistic processing (e.g., Underwood, Schmitt, and Galpin, 2004), Idiomaticity (Wray, 1999), and Connectionism (Ellis, 1998), FSs are among the most commonly discussed and well-documented effective factors in oral fluency both in L1 and L2, few studies have focused on effective methods of teaching such formulas. The present paper investigates a new approach to teaching FSs. The aim of teaching these formulas is obviously to help the learners to add the FSs to their linguistic repertoire and to enable them to use the formulas in the context of situation. In fact, learners need to add the formulas to their long term memory.

Based on different learning theories such as Practice testing (Abbott, 1909), Memory Schedule theory (Russell, 1979), principle of expanding rehearsal (Baddeley, 1997), and retrieval effort hypothesis (Bjork, 1994), spaced productive retrieval (i.e. L1 to L2 retrieval of information using increasing time intervals) can effectively increase retention in long-term memory and facilitate more relaxed learning. This is approved empirically in word learning (Lotfolahi & Salehi, 2017); however, to the authors' best knowledge, spaced retrieval has been scarcely investigated in relation to learning larger units than words and word pairs.

Literature review

Oral fluency

Three types of fluency are proposed in the literature including cognitive or psychological fluency, performative or utterance fluency, and perceived fluency (e.g., Michel, 2017; Segalowitz, 2010). First, Cognitive fluency is "the speaker's ability to efficiently mobilize and integrate the underlying cognitive processes responsible for producing utterances with the characteristics that they have" (Segalowitz, 2010, p. 48). Psychologists and psycholinguists are interested in this type of fluency. In fact, they attend to study "cognitive processes that affect fluency" (Derwing, 2017, p. 247). Second, performative or utterance fluency is mostly defined as eloquent, automatic, and smooth speech (e.g., Freed, 2000; Michel, 2017) with "limited numbers of pauses, hesitations, or reformulations" (Michel, 2017, p. 50). Derwing (2017) believes that utterance fluency is basically the "oral manifestations of the speaker's level of cognitive fluency" (p. 246). Finally, perceived fluency is regarded as the judgment that listeners make based on impressions (Segalowitz, 2010). Some researchers (e.g., Boers et al., 2006), in their studies on fluency, relied on experts' judgments as a measure of the construct.

Measuring the oral fluency

Different methods that are proposed for fluency measurement are based on the definitions provided for the construct. As stated earlier, there are three types of fluency including cognitive fluency, utterance fluency, and perceived fluency. It is not possible to measure cognitive fluency numerically. Anyway, utterance fluency which is the oral manifestation of cognitive fluency can be easily measured through defined formulas in the literature. A summary of the commonly used measures of performative fluency is provided in Table 1.

Table 1. Commonly Used Measures of Fluency

Used Method	How to Measure	Samples Studies
Speech Rate	Dividing the total number of syllables/words by the	e.g., Abdolrezapour, 2017; Baker-Smemoe et al., 2014; Di

	total seconds of speech time, including pauses	Silvio et al., 2016; Ghonsooly, & Hosienpour, 2009; Wood, 2010
Articulation Rate	Dividing the total number of syllables/words by the total seconds of speech time, excluding pauses	e.g., Ghonsooly, & Hosienpour, 2009; Kahng, 2014; Wood, 2010
Mean Length of Run (MLR)	Dividing number of syllables in utterances between pauses(run length) by the total number of runs	e.g., Baker-Smemoe et al., 2014; Di Silvio et al., 2016; Ghonsooly, & Hosienpour, 2009; Kahng, 2014; Segalowitz & Freed, 2004; Wood, 2010
Mean length of pauses (MLP)	Dividing the total length of pauses by the total number of pauses	e.g., Baker-Smemoe et al., 2014; De Jong et al., 2015; Ghonsooly, & Hosienpour, 2009; Kahng, 2014
Mean Syllable Duration or Mean Length of Utterance (MLU) or Average Speaking Duration (ASD)	Dividing total speech time, excluding silent pauses, by total number of syllables (i.e., inverse articulation rate)	e.g., Buhr et al., 2017; De Jong et al., 2015; Lahmann, Steinkrauss, Schmid, 2015
Number of Filled Pauses per minute (Filled Pauses Rate)*	Dividing the total number of filled pauses** by the total seconds of speech time	e.g., Baker-Smemoe et al., 2014; Di Silvio et al., 2016; Ghonsooly, & Hosienpour, 2009
Number of Silent (unfilled) Pauses per minute (Silent Pauses Rate)*	Dividing umber of silent pauses by the total speech time	e.g., De Jong et al., 2015; Di Silvio et al., 2016; Ghonsooly, & Hosienpour, 2009; Kahng, 2014; Lahmann, et al., 2015
Number of Disfluencies per minute	Dividing the total number of repetitions, restarts, repairs, and/or hesitations by the total speech time	e.g., Baker-Smemoe, Dewey, Bown, & Martinsen, 2014; Buhr et al., 2017; ; De Jong et al., 2015; Di Silvio et al., 2016; Ghonsooly, & Hosienpour,

		2009; Kahng, 2014; Lahmann, et al., 2015
** Some researchers (e.g., Vercellotti, 2017) combined filled and unfilled pauses because they believed that using silent or filled pauses simply depends on speakers' speaking style.*		

Formulaic sequences

Nattinger and DeCarrico (1992) specifically used the term *formulaic sequences* (FS) to refer to what was considered as ready-made chunks, prefabricated units, lexical bundles, preassembled speech, word strings, conversational routines, and so on till that time. Wray was the next researcher who used the term FSs in 1999. Since then thousands of studies have appeared in the literature under this name. FS is regarded as an overarching term that "can be long (*you can lead a horse to water, but you can't make him drink*) or short (*oh no!*), or anything in between" (Schmitt, 2004, p. 3). Wray (1999) defined FS as follow:

> A sequence, continuous or discontinuous, of words or other meaning elements, which is, or appears to be, prefabricated, that is, stored and retrieved whole from memory at the time of use, rather than being subject to generation or analysis by the language grammar. (p. 213)

Spaced retrieval

Spaced learning stands versus massed learning. In massed leaning condition, no interval occurs between the initial presentation of the material and following repetitions (Carpenter & DeLosh, 2005) that can be shown like 0-0-0, meaning three times of repetition soon after the first presentation. Theoretically, *spaced reviewing technique* goes back to Russell (1979) who proposed the *Memory Schedule Theory* in 1979. He considers initial repetition of learned material a crucial stage in enhancing memory. In fact, *memory schedule* is planning to establish an organized system of reviews. Russell points that this schedule is applicable to any form of study or any new material. Distributed practice effect was first recognized in late 19th century by Thorndike (1912).

According to Kang (2016) incorporating tests into spaced practices reinforces the benefits of spaced repetition. This is exactly the main principle of *practice testing technique* proposed by Abbott in 1909. *Practice testing* is also referred to as *retrieval practice*, *test-enhanced learning*, or *testing effect*. According to the testing effect theory, retrieving of information will increase their retention in long-term memory (Goldstein, 2014). Spaced retrieval is retrieval of information using increasing time intervals (Clare & Jones, 2008), that is, adding *desired difficulty* to the spaced learning.

Research Questions

Given what has been presented above, this study aims to investigate the effect of teaching FSs through spaced retrievals and non-spaced retrievals on learners' oral fluency and consequently on adding the FSs to the participants' linguistic repertoire. The correlation between FS use and different measures of performative fluency is also investigated empirically. The following research questions are addressed in this study:

1. What is the relationship between the use of FS and three different measures of oral performative fluency (speech rate (SR), mean length of pause (MLP), and mean length of run (MLR))?
2. Is there a significant difference between the group taught FSs with spaced retrievals and the group taught FSs with non-spaced retrievals in terms of three different measures of oral fluency?
3. To what extent are the students in the experimental groups able to use the learnt FSs in their speech in the posttest?

Method

Research strategy and design

Quantitative method was used to answer the research questions. According to the division that Ary, Jacobs, and Sorensen (2013) have specified, *nonrandomized control group, pretest–posttest design*, one of the quasi-experimental designs was used, because random assignment of the participants to the groups was not feasible. The independent variable in this study was the teaching method of the FSs.

Participants' performance in the posttest including speech rate (SR), mean length of pause (MLP), and mean length of run (MLR) were the three dependent variables. In present study pauses equal to or more that 250 ms were taken into account. The length of pauses was determined through Camtasia Studio (version 8.4), a computer software.

Participants

The study was carried out at an English teaching institute in Karaj, Iran. The age of the participants ranged from 14 to 17. The participants consisted of 48 students who voluntarily took part in the research. All the participants were at the intermediate level who had received more than three years of formal English instruction.

Instruments and materials

Proficiency Test; In order to ensure the homogeneity of the participants, the Nelson Test 200C (Fowler & Coe, 1976) was administered to confirm that there was no significant difference between the language proficiency levels of the selected participants. The KR-21 reliability of the test was found to be 0.89.

Picture story task; the participants were provided with six related pictures that showed a story. After 20 seconds of looking over the pictures, the participants started telling the story for two minutes.

Monologue on chosen topic task; the participants were given three different topics to choose from. Monologue was used because it is "a way to standardize the experience for learners". Moreover, monologues provide a "narrative discourse" that "the use of FSs is most apparent" (Wood, 2010, p. 102).

Camtasia Studio; Camtasia is a software to record screen and audio. This software displays the sound waves with a zoom-in power of 30 milliseconds.

Materials include 140 FSs extracted from the academic formulas list provided by Simpson-Vlach and Ellis (2010). They have listed 207 useful FSs for academic speech and 200 for academic writing.

Procedure

Based on the results of Nelson Test 200C, 48 learners were chosen out of 55. Classes were randomly assigned to either the control or the experimental groups; the first experimental group (Group A), containing 16 participants, was taught the FSs with spaced retrievals (0-1-3-8-15); the second experimental group (Group B), containing 16 participants, was taught the FSs with non-spaced retrievals (0-1-1-2-1 or 0-1-2-1-1 according to the participants availability in the institute); and the third group (Group C), containing 16 participants, acted as the control group which was not taught any of the FSs that were listed. All groups took the same English course and material and were taught by the same teacher. They also received the same amount of class instruction (three times a week for two months). The only variable that was different between groups were teaching of FSs in the experimental groups but not in the control group. The pre-test was conducted to check the learners' preliminary speech fluency and their ability to use FSs in their speech. Two different speaking tasks including picture story and monologue were used to extract speech fluency data. Before the first session, participants were invited into a sound treated classroom one by one. The participant and the researcher were seated on either side of a table. Participants' answers to the speaking tasks were recorded with their awareness and ensuring strictest confidentiality. After 20 seconds of looking over the pictures, participants started telling the story for two minutes. Then, the topics for monologue were shown to the participants. They were given one minute to prepare. In both tasks, participants weren't interrupted when two minutes finished. The voices were recorded using a voice recorder (Sony ICD-PX470) that was placed at a distance of 25 cm from the participant's mouth on the table.

Treatment started from the first session of the course. Group A was taught 140 FSs through spaced retrieval in 14 sets. The target FS was introduced and Persian equivalent was provided for the students. Finally the taught FSs were used in some example sentences. After that the retrieval of learnt FSs started. Table 2 shows the spaced retrieval schedule for Group A. Retrievals were conducted as productive recalls

(Nakata, 2016), that is, the participants were given the Persian equivalent and were asked to write the English FS. Instant feedback was provided after the retrieval test using PowerPoint slides.

Table 2. Spaced Retrieval Schedule for Group A

Day	Date	Sets of the FSs	Day	Date	Sets of the FSs
Saturday	2017/04/22	A1**	Monday	2017/05/15	K2
Sunday	2017/04/23	A2- B1	Wednesday	2017/05/17	A5- G4- J3- L1
Monday	2017/04/24	B2	Thursday	2017/05/18	B5- H4- K3- L2
Wednesday	2017/04/26	A3- C1	Saturday	2017/05/20	M1
Thursday	2017/04/27	B3- C2	Sunday	2017/05/21	C5- I4- L3- M2
Saturday	2017/04/29	D1	Wednesday	2017/05/24	D5- J4- M3
Sunday	2017/04/30	C3- D2- E1	Thursday	2017/05/25	E5- K4
Monday	2017/05/01	E2	Saturday	2017/05/27	N1
Wednesday	2017/05/03	A4- D3- F1	Sunday	2017/05/28	F5- L4- N2
Thursday	2017/05/04	B4- E3- F2	Wednesday	2017/05/31	G5- M4- N3
Saturday	2017/05/06	G1	Thursday	2017/06/1	H5
Sunday	2017/05/07	C4- F3- G2- H1	Saturday	2017/06/03	I5
Monday	2017/05/08	H2	Wednesday	2017/06/07	J5- N4
Wednesday	2017/05/10	D4- G3- I1	Thursday	2017/06/08	K5
Thursday	2017/05/11	E4- H3- I2	Sunday	2017/06/11	L5
Saturday	2017/05/13	J1	Wednesday	2017/06/14	M5

Sunday	2017/05/14	F4- I3- J2- K1	Wednesday	2017/06/21	N5
** *Each letter shows group of 10 FSs taught in a day and the numbers next to each letter shows the retrieval number*					

Second experimental group (Group B) was taught the FSs in the same way as Group A but through non-spaced retrievals according to the schedule below (Table 3).

Table 3. Retrieval Schedule for Group B

Day	Date	Sets of the FSs	Day	Date	Sets of the FSs
Saturday	2017/04/22	A1	Sunday	2017/05/21	H4- I2
Sunday	2017/04/23	A2	Monday	2017/05/22	H5- I3
Monday	2017/04/24	A3	Wednesday	2017/05/24	I4- J1
Wednesday	2017/04/26	A4- B1	Thursday	2017/05/25	I5- J2
Thursday	2017/04/27	A5- B2	Saturday	2017/05/27	J3- K1
Saturday	2017/04/29	B3- C1	Sunday	2017/05/28	J4- K2
Sunday	2017/04/30	B4- C2	Monday	2017/05/29	J5- K3
Monday	2017/05/01	B5- C3	Wednesday	2017/05/31	K4
Wednesday	2017/05/03	C4- D1	Thursday	2017/06/01	K5
Thursday	2017/05/04	C5- D2	Saturday	2017/06/03	-
Saturday	2017/05/06	D3- E1	Wednesday	2017/06/07	L1
Sunday	2017/05/07	D4- E2	Thursday	2017/06/08	L2
Monday	2017/05/08	D5- E3	Saturday	2017/06/10	L3- M1
Wednesday	2017/05/10	E4- F1	Sunday	2017/06/11	L4- M2
Thursday	2017/05/11	E5- F2	Monday	2017/06/12	L5- M3
Saturday	2017/05/13	F3- G1	Wednesday	2017/06/14	M4- N1

Sunday	2017/05/14	F4- G2	Thursday	2017/06/15	M5- N2
Monday	2017/05/15	F5- G3	Saturday	2017/06/17	N3
Wednesday	2017/05/17	G4- H1	Sunday	2017/06/18	N4
Thursday	2017/05/18	G5- H2	Monday	2017/06/19	N5
Saturday	2017/05/20	H3- I1			

The posttest was conducted one week after the treatment in the same way as the pretest. Audio files were fed into the Camtasia Studio (version 8.4) to calculate SR, MLP, and MLR. The recorded data were transcribed using Microsoft Word to find the used FSs.

Identifying FSs

The identification procedure for extracting FSs in present study consisted of three stages. Firstly, samples were examined in search of sequences which appeared to be formulaic and were uttered within the same run. Then, the selected sequences were validated in terms of Wray and Namba's (2003) criteria and Simpson-Vlach and Ellis's (2010) list of FSs, and finally corpora search using Michigan Corpus of Academic Spoken English (MICASE) for the sequences that there was doubt about their formuliacity was conducted. Once the formulaic strings were successfully identified, their total in each speech sample were calculated. Wray and Namba's (2003) suggest that a word string is formulaic if it has one or some of the characteristics below:

- grammatically (*if I were you*) and/or semantically unusual (*beat around the bush*),
- associated with a specific situation and/or register (*all best wishes*),
- performs a function as a whole in communication or discourse (*would you please kindly*),
- commonly is used for conveying a specific idea (*same old same old*),

- is accompanied with an action, use of punctuation, or phonological pattern that gives it special status as a unit (to touch a wood as saying *touch wood*),
- grammatically or lexically has unintentionally taken a special status as a unit (many students use *thanks god* instead of thank god),
- is encountered frequently,
- is a clear derivation of something that can be demonstrated to be formulaic in its own right (*early bird catch the breakfast* instead of worm),
- too sophisticated, or not sophisticated enough, to match the speaker's general grammatical and lexical competence,
- have an underlying frame with slots to be filled (Subject+ had+ possessive pronoun+ noun+ pp: *I had my car washed*).

Data Analysis

Correlational analysis, product moment correlation (Pearson *r*) which is used with interval and ratio data (Ary et al., 2013), was used to determine the correlation between the number of used FSs and three measures of participants' oral fluency including speech rate (SR), mean length of pauses (MLP), and mean length of run (MLR). Multivariate analyses of variance (MANOVA) at .05 level of significance was conducted to investigate the second research question. Through using MANOVA there is a better chance of discovering important factors. Moreover, it protects against Type I errors (Gamage, Mathew, & Weerahandi, 2004), that is the probability of incorrectly rejecting the null hypothesis. One-way analysis of variance (ANOVA) was performed to evaluate the three groups' use of FSs in the pretest and the posttest.

Results and discussion

Descriptive statistics

Table 4 provides the descriptive statistics for the fluency scores of the participants in the pretest and the posttest.

Table 4. Descriptive Statistics of the Pretest and the Posttest

		Pretest		Posttest		
		Mean	Std. Deviation	Mean	Std. Deviation	N
SR	Group A	1.29	.20	1.69	.39	16
	Group B	1.29	.22	1.56	.28	16
	Group C	1.31	.28	1.42	.29	16
	Total	1.29	.23	1.56	.34	48
MLP	Group A	1.72	.43	1.16	.39	16
	Group B	1.57	.36	1.28	.40	16
	Group C	1.57	.41	1.62	.41	16
	Total	1.62	.40	1.35	.44	48
MLR	Group A	3.43	.63	4.65	.99	16
	Group B	3.29	.66	3.83	.83	16
	Group C	3.11	.61	3.45	.78	16
	Total	3.28	.63	3.98	.99	48

Homogeneity test

The Nelson Test 200C was conducted to check the homogeneity of the participants. Table 5 illustrates the descriptive statistics of the participants' scores.

Table 5. Descriptive Statistics of the Nelson Test 200C

					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Min	Max
Group A	16	40.87	5.76	1.44	37.80	43.94	32.00	50.00
Group B	16	40.25	7.17	1.79	36.42	44.07	30.00	50.00
Group C	16	41.31	8.16	2.04	36.96	45.66	29.00	50.00

Total	48	40.81	6.96	1.00	38.79	42.83	29.00	50.00

Review of the Shapiro-Wilk test for normality, skewness, and kurtosis statistics suggested that normality was a reasonable assumption for all the three groups in Nelson Test (Table 6).

Table 6. Tests of Normality of the Nelson Test 200C

	Skewness	Kurtosis	Shapiro-Wilk		
			Statistic	df	Sig.
Group A	.11	-1.05	.96	16	.58
Group B	.02	-1.33	.92	16	.18
Group C	-.23	-1.49	.90	16	.11

Therefore, to ensure the homogeneity of the participants in Group A (N=16), Group B (N=16), and Group C (N=16), one way ANOVA was conducted. The results showed that there was not a statistically significant difference between groups ($F(2,45) = .09$, $p = .91$) with regard to language proficiency. Therefore, it was confirmed that the three groups enjoyed similar levels of language proficiency.

Other statistical analyses are explained along with answering each research question.

Research question 1

The first research question dealt with the relationship between the number of used FSs and different measures of oral fluency including SR, MLP, and MLR. A Pearson product-moment correlation was run to determine this relationship (see Table 7).

Table 7. Pearson r Between Measures of Fluency and Number of UFS

	Pretest			Posttest		
	SR	MLP	MLR	SR	MLP	MLR
Pearson *r*	.69**	-.54**	.56**	.73**	-.67**	.81**

Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
N	48	48	48	48	48	48

***. Correlation is significant at the 0.01 level (2-tailed).*

The results showed that there was a strong, positive correlation between the number of used FSs and SR in both the pretest and the posttest. The number of used FSs had a high correlation with the MLR as well. The correlation between FSs and the MLP was strong and negative in both the pretest and the posttest. The most remarkable results to emerge from this data is that as the number of FSs increases in learners' speech, they are able to articulate more syllables in a specific time limit and with shorter pauses. More importantly, they would be able to have their speech with longer runs, or with more number of syllables between pauses, which is regarded one of the dominant indexes for fluent speech (e.g., Freed, 2000; Lennon, 1990). As put forward by Wood (2010), this evidence can point to the facilitated development of speech fluency in ESL by the use of FSs.

The correlation between use of FSs and different temporal measures of fluency can be related to the automatic and whole processing of the FSs. This neurolinguistics view on FSs means that as Wray (2002) believes, FSs are "stored and retrieved whole from memory at the moment of use rather than being subject to generation or analysis by the language grammar" (p. 9). FSs are stored as single lexical units in the brain and consequently are effortless to process and faster to articulate. The correlation also can be related to the accuracy that would be resulted from whole storage of the FSs in the brain. As Ellis (2005) argues, formulaic expressions serve as a basis for rule-based competence. It seems that higher accuracy in speech will lead to higher performative fluency, because with a more accurate speech, there will be lower number of hesitations and repairs, which are indexes of this type of fluency. Finally, the correlation between FSs and fluency can be explained through sociolinguistic or pragmatic reasons (e.g., Kuiper, 2000; Wray, 1999). Social interaction is promoted when we choose the right string of words and perfect way of saying something, or

idiomaticity, rather than using weird and unusual strings. In fact, in different social occasions people expect to hear and also are supposed to use some prefabricated language that is accepted as perfect way. This prefabricated language can be decoded easier than new strings of words (wood, 2002).

The findings of the present research are partially consistent with those of Guz (2014). In her study, she showed a positive and statistically significant correlation between the number of used FSs and speech rate and between the number of used FSs and mean length of run. However, the findings of the present study do not support Guz's findings about the mean length of pause. Guz found that the relationship between FSs and mean length of pause was not significant, whereas the present research showed a significant and negative correlation between the numbers of used FSs and mean length of pause, meaning that using FSs leads to shorter pauses in speech. This inconsistency can be because of the difference in context and designs of the two studies. Guz studied the nature and strength of the relationship between the use of FSs and fluency in oral production of native speakers of Polish. In the present research focus is on EFL context. Moreover, according to the results of a study by De Jong et al. (2015) a part of pause pattern in L1 speech can be related to the personal speaking style of the learners.

The findings of the present research are also in agreement with Cordier (2013). She investigated the presence, nature, and the role of FSs in advanced learners of French and found a significant correlation between the use of FSs and oral fluency. She stated that FSs led to longer speech runs and reduced pausing time.

Research question 2

The second research question dealt with the differences between the groups taught FSs with spaced retrievals and non-spaced retrievals in terms of three different measures of oral fluency. Multivariate analysis of variance (MANOVA) was used for analyzing data at the .05 level of significance.

An assessment of the normality of data is a prerequisite for MANOVA because normal data is an underlying assumption in parametric testing. Review of the Shapiro-Wilk test for normality, skewness, and kurtosis statistics suggested that normality was a reasonable assumption for all the three groups in the pretest and the posttest (see Table 8).

Table 8. Tests of Normality of the Pretest and the posttest

		pretest				
		Skewness	Kurtosis	Shapiro-Wilk		
				Statistic	df	Sig.
SR	Group A	.22	-1.22	.93	16	.25
	Group B	.03	-1.17	.93	16	.27
	Group C	-.05	-.82	.97	16	.89
MLP	Group A	.56	-.77	.93	16	.23
	Group B	.72	-.27	.91	16	.10
	Group C	.90	1.04	.94	16	.33
MLR	Group A	.03	-.57	.96	16	.68
	Group B	.32	-.57	.98	16	.94
	Group C	.39	.09	.98	16	.96
		posttest				
		Skewness	Kurtosis	Shapiro-Wilk		
				Statistic	df	Sig.
SR	Group A	-.14	-1.31	.933	16	.28
	Group B	.37	-.24	.945	16	.42
	Group C	.03	-.75	.950	16	.50
MLP	Group A	.83	-.36	.907	16	.11
	Group B	.70	-.16	.942	16	.37

	Group C	.51	-.68	.941	16	.36
MLR	Group A	-.02	-1.39	.931	16	.26
	Group B	.43	.29	.966	16	.77
	Group C	1.15	1.55	.915	16	.14

In the skewness and kurtosis test of normality, the values more than -2 and less than +2 are considered acceptable in order to prove normal distribution (George & Mallery, 2010). In the Shapiro-Wilk test of normality, if the values are not significant in .05 level then the normality assumption is met. As it is shown in the above table both tests approve the normality assumption.

Box's M-test was conducted to examine the equality of the covariance across the three groups in the pretest and the posttest, which is another pre assumption for MANOVA (Brambor, Clark, & Golder, 2005). Table 9 shows that either in the pretest (Box's M (10.21), p(.68) > (.001)) or in the posttest (Box's M (9.96), p(.70) > (.001)) Box's M was not significant, indicating that there are no significant differences between the covariance matrices.

Table 9. Box's M Test of Equality of Covariance

pretest		**posttest**	
Box's M	10.21	Box's M	9.96
F	.77	F	.75
df1	12	df1	12
df2	9813.46	df2	9813.46
Sig.	.68	Sig.	.70

Therefore, the crucial assumption of equality of variances is not violated and MANOVA is an appropriate test to use.

The analysis of multivariate tests showed that there was not a statistically significant difference in the participants' performance in the

pretest, F (6, 86) = 1.82, p = .1; Wilk's Λ = 0.79, partial η^2 = .11. On the contrary, the analysis of multivariate tests showed that there was a statistically significant difference in the participants' performance in the posttest based on the method of learning the FSs, F (6, 86) = 5.97, p < .0005; Wilk's Λ = 0.50, partial η^2 = .29.

Analyzing between subject effects showed that, teaching and method of teaching the FSs had a statistically significant effect on MLP (F (2, 45) = 5.81; p < .05; partial η^2 = .21) and MLR (F (2, 45) = 7.81; p < .005; partial η^2 = .26), but not on SR (F (2, 45) = 2.76; p = .07; partial η^2 = .11).

Tukey's HSD was conducted in order that group multiple comparisons could be made (Table 10). The results showed that mean scores of SR in the posttest were not statistically significantly different between Group A and Group C (p = .06), not between Group A and Group B (p = .32), and not between Group B and Group C (p = .49). Mean scores of MLP in the posttest were statistically significantly different between Group A and Group C (p < .05), and Group B and Group C (p < .05), but not between Group A and Group B (p = .68). Mean scores of MLR in the posttest were statistically significantly different between Group A and Group B (p < .05), and Group A and Group C (p < .005), but not between Group B and Group C (p = .44).

Table 10. Tukey HSD of MANOVA in the Posttest

Dependent Variables	(I) method	(J) method	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
SR	Group A	Group B	.14	.11	.45	-.1383	.4158
		Group C	.27	.11	.06	-.0083	.5458
	Group B	Group A	-.14	.11	.45	-.4158	.1383
		Group C	.13	.11	.50	-.1471	.4071
	Group C	Group A	-.27	.11	.06	-.5458	.0083

		Group B	-.13	.11	.50	-.4071	.1471
MLP	Group A	Group B	-.12	.14	.68	-.4604	.2229
		Group C	-.46*	.14	.01	-.8041	-.1209
	Group B	Group A	.12	.14	.68	-.2229	.4604
		Group C	-.34*	.14	.04	-.6854	-.0021
	Group C	Group A	.46*	.14	.01	.1209	.8041
		Group B	.34*	.14	.04	.0021	.6854
MLR	Group A	Group B	.82*	.31	.03	.0633	1.5667
		Group C	1.20*	.31	.00	.4483	1.9517
	Group B	Group A	-.82*	.31	.03	-1.5667	-.0633
		Group C	.39	.31	.44	-.3667	1.1367
	Group C	Group A	-1.20*	.31	.00	-1.9517	-.4483
		Group B	-.39	.31	.44	-1.1367	.3667

**. The mean difference is significant at .05 level.*

The results indicated that explicit instruction of the FSs would lead to better oral fluency. This lends support to the previous findings in the literature such as Bakhshizade, Rahimi, and Rajaei (2015), Lee and Yoon (2014), and Tsou and Huang (2012) who found that explicit instruction of the FSs improved EFL learners' oral fluency. In these three studies the researchers did not calculate temporal measures of oral fluency and indicated only one score according to judges' evaluation. In the present research three temporal measures of fluency were calculated for each group and the results revealed that the improved fluency of the experimental groups (Group A and B) were due to the participants' ability to have shorter pauses, that is lower scores in mean length of pause. De Jong et al. (2009) noted that teaching FSs resulted in longer pauses in the participants' speech. Our results do not corroborate their observation because Group B, which was taught without spaced retrievals, had significantly shorter pauses than Group C. This inconsistency can be explained by the different designs of the two

studies. De Jong et al. chose only 10 FSs to teach to the participants during only a single 50 minute session.

The main aim of the present study was to investigate the effect of spaced retrieval of the FSs, after explicit instruction, on learners' oral fluency. Measuring MLR of the participants in the posttest showed that group A, which learnt the FSs through spaced retrieval, outperformed both Group B and group C. but there was not a significant difference between the performance of Group B and group C. This means that spaced retrieval of the FSs after explicit instruction will enable the learners to use longer speech runs which is one of the most important indexes of fluent speech. On the other hand, ANOVA measures of the FS use before and after the treatment showed that that there was no significant difference between groups in the pretest ($F (2, 45) = .39$, $p= .68$), whereas in the posttest there was a significant difference between the groups ($F (2, 45) = 8.76$, $p< .005$). As shown in Table 11, further multivariate comparison revealed that Group A used significantly higher number of FSs than the other two groups. There was no significant difference between Group B and C, indicating that without spaced retrieval explicit teaching of the FSs will not result in adding these formulas to the participants' linguistic repertoire.

Table 11. Tukey HSD: Multiple Comparisons of ANOVA

(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Group A	Group B	4.44*	1.71	.03	.30	8.57
	Group C	7.06*	1.71	.00	2.92	11.20
Group B	Group A	-4.44*	1.71	.03	-8.57	-.30
	Group C	2.63	1.71	.28	-1.50	6.76
Group C	Group A	7.06*	1.71	.00	-11.20	-2.93
	Group B	2.63	1.71	.28	-6.76	1.50

**. The mean difference is significant at 0.05 level.*

These values correlate favorably well with part of the results of DeJong et al. (2009) and Boers et al. (2006) who showed that an increase in the use of FSs led to longer fluent runs. Boers et al (2006) argue that FSs help to increase oral fluency in three ways. First, they help learner to have a native-like production. Second, it increases the mean length of run. And third, using FSs results in higher accuracy.

Due to the holistic and automatic processing of FSs, initially it was thought that Group A would outperform the other groups in speech rate as well. However, measuring speech rate of the participants in the posttest showed that even after the treatment there were not a significant difference between the groups. This showed that teaching FSs with or without spaced retrievals has no effect on this measure of fluency. This can be psychologically explained with a view on personal style of the learners (e.g., De Jong et al., 2015; Loewen & Sato, 2017; Segalowitz, 2010). Segalowitz (2010) believes that speech rate, as a measure of oral fluency, is mostly a "characteristic of the way individuals speak in general and not just characteristic of their L2 speech" (p. 35).

Research question 3

The third research question dealt with the extent to which the participants in the experimental groups were able to use the learnt FSs in their speech in the posttest. Different tasks and methods that are used over the literature for teaching FSs can stand on a continuum of *conscious raising* versus *unconscious*, *explicit* versus *implicit*, and *analyzed* versus *holistic* instruction. Whatever the method of teaching is, it should result in ability to use the FSs actively. This means, learners should be able to add the formulas to their linguistic repertoire or long term memory in order to use them actively in the context of situation. In the present study, an explicit and holistic instruction along with further spaced or non-spaced retrievals was conducted to find out an effective way of teaching the FSs. The results of the ANOVA measures of the number of FS use revealed that in the pretest, like fluency measures, there was not a significant difference between the control and the experimental groups. Group A significantly outperformed the other

groups. There was not a significant difference between Group B and Group C in the number of FS use, meaning that explicit instruction of FSs without spaced retrieval will not result in expected improvement of the participants in FS use. To find out to what extent the participants could use the taught FSs actively, the used FSs were analyzed and the percent of the formulas which were in the taught list were determined (see Table 12).

Table 12. Number and Percent of FSU in the Pretest and the Posttest

	Mean number of FSs in the pretest (in 2 mins of speech)	Percent of the FSs which are in the list	Mean number of FSs in the posttest (in 2 mins of speech)	Percent of the FSs which are in the list
Group A	15.56	13.2 %	24.44	41.63 %
Group B	14.81	15.11 %	20.00	19.9 %
Group C	14.44	12.23 %	17.38	14.83%

The results showed that Group B which learnt the FSs without spaced retrieval could not actively use the formulas in their speech. This concurs well with De Jong et al. (2009) who found that explicit instruction of FSs did not result in active use of them in the participants' speech. De Jong et al stated that the taught FSs in their study were probably not stored as chunks and retrieval was not automatized. The results of the present study indicate that if explicit instruction of the formulas be followed with spaced productive retrievals, the participants will be able to add these formulas to their linguistic repertoire and can use them actively in context of situation.

To sum up, it can be concluded that spaced retrieval of the FSs helps learners to be fluent speakers in two ways. First, just like explicit instruction without spaced retrieval it can decrease pause duration in the participants' speech. Lower score in MLP, which is one of the utterance or performative fluency measures, helps the speech to seem more fluent. Second, contrary to non-spaced retrieval, spaced retrieval

helps learners to add the formulas to their linguistic repertoire and consequently will enable the learners to articulate longer runs in their speech. In fact, productive retrieving of the FSs helps the FSs to be real formulas for non-native learners. Corpus analysis shows a high frequency for the FSs in native context, but for non-native context spaced repetition of such formulas helps the learners to store and retrieve the formulas whole from memory.

Conclusion

The main aim of the present study was to investigate the effect of using or not using spaced productive retrieval of a set of 140 FSs that were taught explicitly to the participants. Although the positive effect of FSs on oral fluency is approved theoretically over the literature, the empirical relationship between the FS use and different temporal measures of oral fluency is not investigated widely. Therefore, in the present study this relationship was also investigated. Finally the participants' ability to use the FSs before and after the treatment were studied. The evidence from this study points towards the idea that the use of FSs in speech leads to higher speed, shorter pauses, and longer runs. This is explained over the literature by holistic and automatic processing of FSs. In counting the FSs it is of outmost importance to consider the 'within the same run' rule. String of words that are considered as FSs out of context, cannot be counted as formulaic if they are uttered in more than one run. For example the FS "*I think so*" should not be considered as a FS if is uttered like "*I* [pause] *think* [pause] *so*". This study has highlighted that teaching the FSs with or without spaced retrievals has no significant effect on the participants' speech rate. Speech rate develops with proficiency level and is mostly a general style of individuals rather than a characteristic of their L2 speech (e.g., De Jong et al., 2015; Loewen & Sato, 2017; Segalowitz, 2010). The present study demonstrated that explicit and holistic teaching of the FSs, whether with or without spaced retrievals, helps the participants to have shorter pauses which is an indicator of fluent speech. The results showed that considerable progress has been made with regard to length of speech runs in the group which learned the FSs through spaced

retrievals. This important indicator of oral fluency was the fundamental difference between this group and the other two groups including group which learned the formulas without spaced retrievals and the control group. Taken together, these findings suggest an essential role for spaced retrieval of the FSs in having a fluent speech because the length of run is regarded as an important index of fluent speech over the literature (e.g., Freed, 2000; Lennon, 1990). The results indicated that spaced productive retrieval of the FSs after their explicit and holistic teaching, helped the learners to add the formulas to their long term memory so that they could use more than 40 percent of the formulas in their speech which, in its turn, led to longer mean length of runs. In fact, active use of the taught FSs will happen if the instruction is followed by spaced productive retrieval and merely explicit teaching of formulas is useless in adding the formulas to the participants' linguistic repertoire.

The present study provides an encouragement for a new way to teach FSs. The strength of our contribution lies in the participants' ability to add the FSs to their linguistic repertoire and to use the formulas actively after the treatment. These findings add to a growing body of literature on the effect of FS use on oral fluency and the effect of spaced retrieval on active use of the learnt FSs.

The present research can serve as a base for future studies on the following areas. First, a vital issue for future research is to analyze L1 speech samples of the same participants and to evaluate different fluency measures in these samples in order to find out which measures of fluency in L1 has any correlation with fluency in L2. In this study it was found that the participants' speech rate was independent of teaching methods and was growing with a similar pattern in all groups even after the treatment. Some researchers approve this and relate the speech rate to personal characteristics style of the learners. Comparing speech rate in L1 and L2 would reveal interesting results. Second, an important question to resolve for future studies is the effect of spaced retrieval of FSs on perceived fluency rather than performative fluency. To do so, it is needed to use some experts as judges to evaluate the speech samples.

There is a possibility that dissimilar evaluations would have arisen if the focus had been on perceived fluency. Third, on a wider level, qualitative analysis is also needed to investigate how the way the participants use the FSs changes. In fact, qualitative analysis would reveal interesting and worthwhile information about the effect of teaching FSs with spaced retrievals. Fourth, another suggestion is putting under test the effect of all four retrieval directions on adding FSs to long term memory. Four different retrieval directions has been presented in the literature. The present study has investigated the effect of only one retrieval direction (productive retrieval or productive recall). Consequently, more experiments will be needed to verify the effect of three other retrieval directions (receptive recall, receptive recognition, and productive recognition). And finally, it is suggested to conduct different studies by changing different features of the design of the present study. For example, trying other teaching methods for teaching the FSs rather than explicit and holistic method, teaching different lists of FSs, and to study the effect of gender and proficiency level by examining different participants.

The findings of the present research have considerable pedagogical implications. Native speakers acquire their L1 FSs slowly over time and more importantly with a good amount of repetitions. However, L2 learners need to master thousands of items in a much shorter time span, with much less input and encounters to the formulas. The result of the present study can move EFL teachers to use spaced retrievals not only in their lesson plans but directly in the classroom, so that the learners get provided with acceptable numbers of repetitions of the FSs. To achieve this, teachers need to get aware of the nature of the FSs. In spite of growing interest and awareness of FSs among researchers, there has been little effort to practically utilize them in language teaching classes (wood, 2010). Seeing that spaced productive retrievals of the FSs in this study was designed for delivery in the classroom, the approach adopted in the present study has plausible and potential benefits in the classroom. Teachers can use the spacing pattern given in this study to help their students to retrieve the target FSs in order to improve their

ability to actively use the formulas. The present research suggests that educational policy makers should encourage curriculum developers to design and import proper spaced productive retrievals tasks in the textbooks. The present findings have important implications for solving students' problems in speaking second language. The ability to use FSs enhances students' performance in oral fluency in different measures of speech rate, mean length of pause, and mean length of run. Therefore, the significance of FSs in language teaching and learning should not be neglected.

It is plausible that a number of limitations might have influenced the results obtained. Sample size is one of the main limitations in the present study. There were 16 students in each group. Adding the number of the participants in each group can give more reliable results and can reduce the selection threat that affects the results due to the use of non-random sampling method which is a source of contamination in this study. Another source of error is evaluation of only one kind of fluency. Given that the focus of the present study was on performative fluency there is a possibility that dissimilar evaluations would have arisen if the focus had been on perceived fluency.

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Appendix

Sets of target formulaic sequences

A

1.	a variety of ……	..... گوناگون
2.	at the same time	در همان زمان
3.	from the point of view of……..	.....از نقطه نظرِ
4.	in other words	به عبارت دیگه
5.	in this way	این طوری
6.	it is not correct	درست نیست
7.	different from the	متفاوت از
8.	if you want to	اگه می خوای
9.	the development of	.....پیشرفتِ
10.	the use of……	..... استفاده از

B

11.	according to the……	..... بر طبقِ
12.	do you want me to……	.....ازم می خوای که
13.	if you look at it	اگه بهش نگاه بندازی
14.	in the sense that……	……به این معنی که
15.	it's important	مهمه
16.	the extent to which ……..	.....در حدی که
17.	the real world	دنیای واقعی
18.	exactly the same	دقیقا همان
19.	we'll talk about it	در موردش صحبت خواهیم کرد
20.	you know what	می دونی چیه

C

21.	a function of …….	……عملکردی از
22.	as a function	به عنوان یک عملکرد
23.	can be used	می تونه استفاده بشه
24.	focus on the……	……تمرکز بر
25.	how do you know	از کجا می دونی
26.	in order to……..	……برای این که
27.	is based on …	بر پایه ی ..... است
28.	is to be taken	برداشته میشه
29.	so that	به طوری که
30.	the basis of	...اساسِ

D

31.	a list of ….	لیستی از ....
32.	as you can see…….	همون طور که می بینی.....
33.	does that make sense?	هیچ معنی میده؟
34.	I was gonna say…….	می خواستم بگم……
35.	in such a way……..	به طریقی که……
36.	doesn't have to	مجبور نیست
37.	the amount of	مقدارِ ....
38.	the fact that……	این حقیقت که.....
39.	there was a child who……	یه بچه بودش که…….
40.	whether or not it rains	چه بارون بباره چه نباره

E

41.	a little bit about……	یه خرده درباره ی …….
42.	as an example	به عنوان مثال
43.	difference between the two	فرق بینِ آن دو
44.	go back to the……	برگرد به……
45.	in response to ……..	در جواب به……
46.	it can be said that……	میشه گفت که ……..
47.	of these two	از این دو تا
48.	the definition of the second	تعریف دومین
49.	the process of ….	روندِ .....
50.	this is not the same	این همون نیست

F

51.	a number of……	تعدادی از……
52.	as well as ……	به خوبی ……..
53.	for example if……	مثلا اگه……
54.	trying to figure ut	تلاش برای سردرآوردن
55.	is much more fun	خیلی باحال تره
56.	it's referred to as	به عنوان ..... ذکر شده است
57.	that this is perfect is a fact	این که این عالیه یه حقیقته
58.	the role of …. in….	نقش ..... در…
59.	what are these?	اینا چی ان؟
60.	you're talking about……	داری در مورد .....صحبت می کنی

G

61.	a series of …	یک سری از ....

62.	don't worry about it	در مورد اون نگران نباش
63.	I was talking about you	داشتم در مورد شما صحبت می کردم
64.	it does not make sense	به نظر عاقلانه نمیاد
65.	tell me what you want	بهم بگو چی می خوای
66.	the first is ….	اولیش هست ....
67.	the size of the……..	……. اندازه ی
68.	this would be great	عالی میشه
69.	we're gonna talk about…….	……. می خوایم صحبت کنیم در مورد
70.	you might want to…….	……..شاید بخوای که

H

71.	a set of……	……. یک مجموعه از
72.	due to the…….	……. به دلیلِ
73.	I have a question	یه سوال دارم
74.	is that the ….	همون .....ـه است
75.	let me just …….	……فقط اجازه بده که
76.	the importance of……	……..اهمیتِ
77.	there is an/a ….. that…….	……. یه .... هست که
78.	to make sure	برا اطمینان
79.	we've talked about you	در مورد تو صحبت کرده ایم
80.	you know what I mean.	می دونی منظورم چیه.

I

81.	an example of……..	……..یه نمونه از
82.	because it is …	چون ..... است
83.	for example in …	مثلا تو ....
84.	in the same ….	در همان .....
85.	it turns out that	معلومه که
86.	the difference between	تفاوت بین
87.	the level of….	سطحِ ...
88.	the relationship between……	.....ارتباط بین
89.	ways in which …..	راه هایی که با اون ....
90.	you don't need to……..	…….. لازم نیست که

J

91.	and so on	و غیره
92.	both of these …..	هر دوی این .....
93.	I'll show you	نشونت می دم
94.	it looks like …….	به نظر ..... می رسه

95.	on the basis of…….	بر اساسِ……..
96.	the effects of……	تاثیراتِ……..
97.	there is no excuse	بهونه ای وجود نداره
98.	this is not a good reason for….	این دلیل خوبی نیست برای……..
99.	to show that……..	برای نشان دادن این که …….
100.	what does that mean?	یعنی چی؟

K

101.	as a result of……	به عنوان نتایجِ……
102.	first of all	اول از همه
103.	in terms of……..	بر حسب.....
104.	it may be real	شاید واقعی باشه
105.	let's look at…….	بیا نگاه بندازیم به……..
106.	the effect of ….	تاثیرِ ....
107.	the way in which …	روشی که با اون ...
108.	this type of ….	این نوع از ....
109.	we were talking about…….	داشتیم صحبت می کردیم در مورد …….
110.	you've got a ….	یه ..... داری

L

111.	as opposed to……	درست برخلافِ ……
112.	different types of …..	انوع مختلفی از ....
113.	I mean if you……..	منظورم اینه که اگر تو……
114.	in the case of…….	در رابطه با……..
115.	it doesn't matter	مهم نیست
116.	it's more likely to……. ……	احتمالی زیادی هست که
117.	she has to be there	مجبوره که اونجا باشه
118.	the notion of ….	مفهومِ ....
119.	there are three ….	سه تا ..... وجود داره
120.	we can see that……..	…….. می بینیم که

M

121.	assume that the……..	فرض کن که……
122.	each of these	هر یک از این ها
123.	in a sense	از یه نظر
124.	in this case	در این مورد
125.	result of ….	نتیجه ی ....
126.	keep in mind that……..	…….. یادت باشه که
127.	part of the……..	بخشی از……..

128. the best way to……. بهترین راهِ……..
129. the same as …. درست مثل ...
130. may not be …. شاید ..... نباشه

N

131. at this point در این لحظه
132. for those of you who…… برا کسانی از شما که ……..
133. in relation to…… در ارتباط با……
134. is for the …. برای .... است
135. it's associated with the …. در ارتباط با .... است
136. make sure that…… مطمئن شو که……
137. the ability to ….. تواناییِ ....
138. the presence of …. حضورِ ....
139. there may be a good reason for…. شاید دلیل خوبی وجود داشته باشه برای
140. to each other به همدیگه