The Relationship between Lexical Fluency, Temporal Fluency, and Language Proficiency in Iranian EFL Context

JAVAD REZAZADEH YAZDELI
Arak University
The Islamic Republic of Iran

MORTEZA MELLATI
Department of Applied Linguistics
Payame Noor University (PNU)
The Islamic Republic of Iran
mellati.morteza@gmail.com

MOSTAFA MEHDIZADEH
University of Tehran
The Islamic Republic of Iran

ABSTRACT

Lexical Fluency Units (LFUs) are strings of words that act like single items in language users' mental lexicon. Recently, there has been a resurgence of interest in analyzing them in learners' speech and classifying them into different types (Ushigusa 2008, Wood 2012). The literature in this particular field of study stated that the higher use of lexical fluency units might lead to the higher score on tests of oral English proficiency; therefore, the present study investigated the relationship between lexical fluency, temporal fluency (TF), and proficiency. To conduct the study, forty Iranian EFL teachers with TOEFL scores above 570 were chosen. To ensure that they have acquired competency in communication by which they can be employed as an instructor in the real context, they took an Oral English Proficiency Test (OEPT). Then, the sounds recorded from OEPT were analysed by PRRAT and Transcriber software and the transcripts of their responses were also analysed for detection of lexical fluency units (LFUs). Results indicated that teachers who incorporated more LFUs in their speech had higher TF ratio and consequently higher proficiency score. The interpretations and implementations are also discussed.

Keywords: lexical fluency; temporal fluency (TF); lexical fluency units (LFUs); language proficiency; lexicon

INTRODUCTION

Speaking fluency and proficiency are the two most difficult field concepts to be defined. Fillmore (1979) defines fluency as the speaker's ability to fill time with talk, and when speakers are fluent in this way, they do not have to stop many times to think of what to say next or how to phrase it. As he illustrates, fluency depends on a range of factors including having quick access to a vast amount of lexicon and practiced control of syntactic devices. Fluency means being able to decide promptly when it is appropriate and efficient to use lexicon, as well as having familiarity with interactional and discourse schemata.

Fluency and accuracy have always been the most important topics since the beginning days of oral performance discussion, specifically in Communicative Language Teaching (CLT) era (Mellati, Khademi & Etela 2015). According to the general knowledge of the literature, on the one hand, grammatical accuracy may interfere with fluency; as learner's grammatical monitoring increase, their fluency may decrease. On the other hand, as proficiency develops and automaticity increases, learners will be able to speak more fluently by retrieving lexical fluency units promptly without difficulty to resort to their syntactic knowledge. In the same way, researchers claim that lexical fluency units (string of words that came together and make speaking process run smoothly) are unique assets to language learners and help them to enhance speaking fluency. As a result, teaching lexical fluency

units is beneficial (Nattinger & DeCarrico 1992, Lewis 1993, Wood 2001, Boers & Limdstromberg 2005, Daller, Milton & Treffers-Daller 2007, Durrant 2008, Jong & Perfetti 2011, Farashaiyan & Tan 2012). Before any discussion about the abstract concepts of proficiency and fluency, there is some jargon that should be defined clearly. The underpinning concepts of fluency that are discussed in the current study are temporal fluency (TF) and perceptual fluency (PF) and in proficiency concepts are lexical chunks (LC) and lexical fluency (LF) that are defined briefly here. According to Lennon (1990), TF is the quantitative part of overall speaking fluency that can be measured mechanically by human or by machine, which includes speaking rate, speech-pause relationships, and fluency of dysfluency markers such as hesitation, repletion, and self-correction. Perceptual Fluency means the ease with which information is processed. This sense of fluency exists in the listener's mind and corresponds to holistic rating scales. This description of oral language is akin to descriptors such as "continuity, smoothness or evenness of speech" (Koponen & Riggenbach 2000, Ginther, Dimova and Yang 2010, Johnson, Mercado & Acevedo 2012). Schmitt (2000) defines lexical chunks as wherein "a single meaning is attached to more than one word, for example, phrasal verbs (*give up*), compounds (*freeze-dry*), and idioms (*burn the midnight oil*)". Lexical chunks are given different labels in the literature for example: lexical phrases, formulaic language, fixed phrases, formulaic speech, formulaic units, prefabricated units, preassembled chunks, lexical fluency units (p. 400).

The relationship between components of oral fluency and the use of lexical fluency units has been a topic that attracts the attention of psycholinguists and ESL researchers who have found indications of a positive correlation between them (Pawley & Syder 1983, Towell, Hawkins & Bazergui 1996, Ushigusa 2008, Lindstromberg & Frank 2008, Ong & Zhang 2010). They suggest that lexical fluency units, or formulaic sequence of words, play a significant role in language acquisition. In the same line, according to Lewis' (1993) lexical approach, only a minority of spoken sentences is entirely novel creations and lexical fluency units (LFUs) functioning as chunks or memorised patterns form a high portion of the fluent stretches of speech.

Researchers contended that building a mental store of prefabricated sequences of words, also known as chunks of language (Foster, 2001), formulaic sequences (Underwood, Schmitt & Galpin 2004), lexical bundles (Biber, Johansson, Leech, Conrad & Finegan 1999), lexical phrases (Nattinger & DeCarrico 1992, Towell et al. 1996), or lexicalised sentence stems (Pawley & Syder 1983), may help second language (L2) learners become more fluent or proficient in a second language (Lewis 1993, 2000, Nattinger & DeCarrico 1992, Luo, Luk & Bialystok 2010, Wood 2001, 2012). Prefabricated sequences of words (prefabs) are argued to be stored in and retrieved from memory as single units; they are associated with automaticity (McLaughlin, Rossman & McLeod 1983) or proceduralisation (Towell et al. 1996); and their use is claimed to reduce time for speech-planning and speech-production. Moreover, the processing of lexicalised prefabs has been found to be faster than the processing of non-prefabricated units, apparently because of bypassing syntactic analysis (Jiang & Nekrasova 2007). When a fluent L1 or L2 speaker utters a series of lexical fluency units without pauses, the speaker may not be constructing the phrases or clauses from single word constituents in a linear fashion using their knowledge of syntax, but rather retrieving a fixed form from their mental lexicon (Ushigusa 2008). Thus, the burden of constructing every part of every utterance is lightened by the use of lexical fluency units.

Although the relationship between lexical fluency and oral fluency is accepted by many researchers, no systematic analysis of lexical fluency categorisation and their relationship to oral fluency has been made, except by Ushigusa (2008) and Wood (2012). On the basis of review of the literature, it can be claimed that, few, if any, studies have considered the relationship between lexical fluency and temporal fluency of EFL speakers.

With the aim of improving speaking fluency and its approaching implication for language teaching, this study investigated the relationship between lexical fluency and temporal measures of fluency of Iranian EFL teachers. It would be of interest also to explore which type of lexical fluency units has more influence on the speaking fluency of EFL speakers.

Hitherto, studies (Lewis 1993, 2000, Nattinger & DeCarrico 1992, Wood 2001, Ushigusa 2008, Grogan, Jones, Ali, Crinion, Orabona, Mechias et al. 2012, Kashiha & Chan 2014) have indicated that vocabulary knowledge and speaking fluency have a positive correlation. However, there are two important issues that need to be addressed namely, the type of lexical fluency units that should be learned first and the type of lexical fluency that might lead to speaking fluency. However, no such study has been conducted in Iranian EFL context; therefore, the current study attempted to examine the correlation between temporal aspect of fluency and lexical fluency and to investigate the type of lexical fluency units that might have more impact on the speaking fluency of Iranian EFL teachers.

The presupposition of this study is that incorporating certain types of lexical fluency units might have significant influence on fostering speaking fluency by minimizing speech planning time and decreasing speech pause time. The findings of this study might provide some insights and information on which kinds of prefabricated sequence of words might have more relation with temporal fluency. Moreover, they might provide a clear guidance to teachers and curriculum developers in the prioritisation of lexical chunks. Finally, the study may reveal whether the subjective and perceptual judgments of raters correlate with mechanical and objective judgments of oral proficiency scores or not.

RESEARCH QUESTIONS

1) Do Iranian EFL teachers with different Oral English Proficiency Test (OEPT) scores, display different patterns of oral performance as measured by temporal measures of fluency?
2) Is there any significant relationship between lexical fluency (in number and type) of Iranian EFL teachers and their degree of temporal fluency?
3) Is lexical fluency more related to the proficiency level of Iranian EFL teachers than temporal fluency (TF)?

REVIEW OF LITERATURE

From a linguistic point of view, Fillmore (1979) provided a logical description of first language (L1) fluency phenomena, which he relates to general conceptualisations of proficiency. He has considered the importance of demonstrated knowledge of formulaic expressions in everyday judgments of a speaker's fluency in a language. He described four types of abilities which can be indications of fluency in the speaker's native language: first, "the ability to talk at length with few pauses and the ability to fill time with talk"; second, "the ability to talk in coherent, reasoned, and 'semantically dense' sentences"; third, "the ability to have appropriate things to say in a wide range of contexts"; and fourth, the ability "to be creative and imaginative in language use, to express ideas in novel ways, to pun, to make up jokes, to attend to the sound independently of the sense, to vary styles, to create and build on metaphors" (p. 92).

TEMPORAL FLUENCY

The backbone of fluency is related to the temporal aspect of speech such as speaking rate, speech-pause relationships, and the fluency of dysfluency markers such as hesitation,

repetition and self-correction which can be measured by machine or by human impression (Lennon 1990, Freed 1995). When perceptual fluency was discussed earlier, it was defined as subjective and holistic, but this has been used for most oral proficiency rating scales in second language assessment. Temporal fluency is the type of fluency that can be measured and quantified. Thus, temporal fluency is also known as temporal measures of fluency (Luoma 2004). Just as perceptual fluency is useful for assessing oral fluency, temporal fluency, as a set of measurable variables can also be considered useful for assessing oral fluency. Temporal fluency is often quantified on the basis of the number of words or syllables spoken or the number or the lengths of hesitation pauses inserted in the delivery (Wood 2012).

Goldman-Eisler (1968) carried out one of the earliest systematic quantitative studies on L1 hesitation and non-fluency phenomena, utilizing temporal measures of fluency, and silent pauses. Likewise, Levelt's (1989) theoretical work has been influential with respect to explicating the mechanisms of L1 oral production. As discussed in Schmidt (1992), there are a number of research studies useful for finding out about temporal factors of oral L2 fluency. In the first important study, McLaughlin et al. (1983) discussed the relationship between mechanisms of automaticity and second language learning. In the second important study, the idea of proceduralisation of knowledge is used by Towell et al. (1996) to explain the development of L2 fluency. They discussed the psycholinguistic model and proceduralisation of linguistic knowledge in terms of temporal measures of fluency.

In their longitudinal study on the development of advanced French learner's oral fluency, McLaughlin et al. (1983) administered pre- and post-tests before and after their treatment. They measured fluency by examining the syntactic complexity of the linguistic units produced by the participants. Fluency was measured with the use of temporal measures such as mean length of run, phonation time ratio, and average length of pause. Mean length of run is the temporal measure by which fluency is indicated with the average number of syllables produced between silent pauses that are, in Towell et al.'s (1996) study, longer than .28 seconds. Phonation time rate is the temporal measure in which the degree of temporal fluency is indicated by the proportion of the total length of utterances (including non-lexical filled pauses) to the total length of speech production. Average length of pauses is the temporal measure in which fluency is indicated with the average length of silent pauses longer than .28 seconds. Towell et al. hypothesised that the development of fluency would be shown by a set of changes in these measures over time. They argued that there are relationships between temporal measures of fluency and Levelt's (1989) model of speech production with the conceptualiser, formulator, and articulator. They assumed that the workings of the three major elements for speech production are indicated by speaking rate, which is the average number of syllables (produced per minute) within a given delivery of speech including pauses. They argued that speaking rate increases as the proceduralisation of knowledge increases.

Towell et al. also assumed that the articulator phase of the model is primarily related to articulation rate; in other words, any increase in articulation rate, which is the total number of produced syllables divided by the amount of time taken to produce them excluding pause time, can be understood as a sign of proceduralisation within the articulator phase. As for the formulator of the model, an increase in the mean length of run would be an indication of an increased proceduralisation in the formulator only when the average length of pauses remains the same or does not increase and the phonation time ratio remains the same or does not decrease. Towell et al. explained that their participant's increased proceduralisation of syntax and of lexical phrases was indicated by the changes of these temporal measures of fluency.

As for qualitative analysis of syntactic structure for identifying the development of fluency, Towell et al. (1996) observed sentence-building blocks of utterances in the linguistic

performances of the participant who showed high levels of improvement on the mean length of run between pre- and post-tests. Both Towell et al. (1996) and Goldman-Eisler (1968) argued that pausing phenomena provide important information about difficulties that the speaker experiences when he / she conceptualises and formulates what to say. Due to this recognised importance of pausing phenomena, the following review of the literature discusses definitions of hesitation pauses, more specifically, silent or non-filled pauses and filled pauses. Juncture and non-juncture pauses are two types of silent pauses. Juncture pauses are inserted when there is a grammatical break between clause and phrases, and non-juncture pauses occur where there is no grammatical break (Goldman-Eisler 1968). In Lennon (1990), Rekart and Dunkel (1992), Riazantseva (2001), and Ushigusa (2008), both juncture and non-juncture silent pauses were included in silent pauses. Silent pauses are precisely defined as "any interval of the oscillographic trace where the amplitude is indistinguishable from that of the background noise" (Duez cited in Riazantseva 2001, p. 508). Researchers attempted to determine guidelines for what is considered a silent pause. Goldman-Eisler (1968) argued that breaks of vocal sounds shorter than .25 seconds are not considered as discontinuities of speech flow. They are not hesitation pauses but rather stoppages associated with phonetic structures of words or breathe taking requirements. Lennon (1990) used 20 seconds for his study to investigate fluency in ESL. Cenoz (1998), in a study of lexical and non-lexical pauses in L2 speech, also used the criterion of the duration of .20 seconds for silent pauses. In Riazantseva (2001), a study investigating the relationship between pauses and ESL proficiency, silent pauses between .10 and .3 seconds were used for analysis.

LEXICAL FLUENCY

Hitherto, the literature review has discussed the nuts and bolts of issues associated with fluency. This section of the literature review discusses another variable of the study: Lexical Fluency Units (LFUs) and their importance as already shown in different studies. There are different types of lexical fluency units. LF means the coherent and systematic use of lexical chunks in a way that makes the speaker's oral production effortless and fluid. These types are subset categories that belong to prefabricated sequence of words. These subset categories include idiomatic lexical fluency units (that include phrasal verbs and other idiomatic expressions) and literal lexical fluency units (verbal phrases, lexical fluency small words, lexical fluency discourse markers, and collocations) (Ushigusa 2008). Prefabs, a short form of 'prefabricated sequences' (Oppenheim 2000, Schmidt 1992, Wood 2001, Namvar 2012) of words, refer to the super ordinate category to which all lexical fluency units theoretically belong. Idiomatic and literal lexical fluency units are characterised by polarised degrees of compositionality / non-compositionality of meanings and fixed-ness / variability of syntactic structures.

METHODOLOGY

PARTICIPANTS

The participants of this study were 40 English language teachers, of which 20 were female. At the time of study, all the teachers took part in advance language courses and they had passed the TOEFL test with a score of at least 570 as a prerequisite of teaching in one of the institutes in Tehran (Khavaran Cultural Center). Based on their licenses, teaching experience, TOEFL score and interview, they were teaching at three major levels namely children, teenagers, and adults. The participants' age ranged from 19 to 28, which indicates that the

teachers were pretty young and mostly novice. Their teaching experiences were between three and five years. The OEPT test was administered by the head supervisor of the institute in order to evaluate teachers' competency in communication. The participants knew that the test results will be influential for their promotion and salary increase.

INSTRUMENTS

The instruments used in this study comprised an Oral English Proficiency Test (OEP), PRAAT (a speech analysis software) and Transcriber (another speech analysis software). The OEPT is a computer-based semi-direct test. When test-takers took the test, they first sat in front of the computers wearing a head-set to listen to the instructions and questions, and using a microphone to record their responses to the questions of up to two minutes in length. Before they begin recording their responses, test-takers were given two warm up questions. Before starting the recording of their rated responses to each question, test takers were given three minutes of preparation time, during which they were allowed to take notes. Then the recorded replies were evaluated by two raters based on the OEPT scale. There were a variety of test items within one test such as Read Aloud, Interpret Graph, Express an Opinion, Compare/Contrast, Offer Advice, Pass on Information (Memo), and Pass on Information (Telephone Message).

PRAAT and Transcriber are computer-based software used for speech analysis, which are useful for distinguishing silent pauses from phonations. By providing oscillographic pictures, they separated silent pauses from phonations. The oscillographic pictures were used for OEPT responses to measure the lengths of pauses (see Figure 1). In the oscillographic pictures, silent pauses are mainly represented by straight waveless portions of the line, whereas sounds, whether they are vocal or background, are represented by wavy portions of the line.

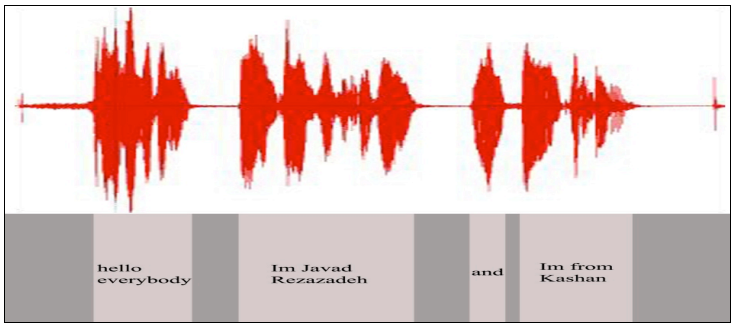

FIGURE 1. An example of visualised sounds by PRAAT software (silent pauses are shown in dark gray)

It was necessary to both visually identify vertical lines on the graph and listen to the recorded sounds to distinguish silent pauses from utterances. By only looking at the graph, it could not be determined whether vertical lines would indicate vocal sounds or silent pauses because silent pauses include sounds for breathing which are often shown by vertical lines just like vocal sounds on the graph. By highlighting one part of the line by dragging the cursor on the part in the graph, the PRAAT software would play the sound of the part, allowing the researcher to focus on that part to distinguish the nature of the sound. When it was difficult to identify a sound, the researcher could also magnify the sound on the graph and play it. In order to decrease pause identification mistakes, the Transcriber software was used to see whether they produce the same oscillographic picture or not. PRAAT and Transcriber can grasp small peripheral physical sounds. Speakers can create physical sounds simply by opening the mouth. A sound which is made can be recorded and visually represented by PRAAT and Transcriber.

PROCEDURES

The participants' responses to the OEPT, which digitally recorded oral data, were used for the analysis. Then, OEPT responses were rated by two raters. The score range was from 35 to 60, with 35 representing the lowest oral proficiency and 60 the highest. Two raters confirmed the consistency of the responses. In other words, the responses had rater reliability. The OEPT was administered to ensure that competence in English would not be a barrier in communication between graduate students, teaching assistants / instructors, and the undergraduate students with whom they have direct contact.

For the purpose of measuring temporal variables of speech production, the current study utilised two software, namely Transcriber and PRAAT, which were used by Kormos and Denes (2004) and Ushigusa (2008), respectively. Using these programs, each silent pause was detected and measured in milliseconds. Every speech run discernible from the amplitude of the surroundings noise was transcribed by the researcher and with the help of these programs the duration of speech runs was visualised (e.g. FIGURE 1). The silent pauses are shown in dark gray and the sounds are shown in light gray.

To examine temporal measures of fluency, first, all occurrences of pauses were marked in the PRAAT and Transcriber software and then transferred to an Excel spread sheet. In the meantime, 40 OEPT response items was transcribed on Microsoft Word pages. Second, the number of occurrences of lexical fluency, number of syllables, and number of words were counted on the Microsoft Word file and were copied to an Excel spreadsheet. The Mathematical functions in the Excel spreadsheet calculated all the temporal measures of fluency on the basis of the total response time, the numbers of words and syllables of every response, the lengths and numbers of silent pauses longer than .25 seconds. Third, the OEPT scores of the responses were added to the Excel spreadsheet. Finally, the three sets of variables of the study were transferred from the Excel spreadsheet onto the input section of The Statistical Package for the Social Sciences (SPSS) which was used for the analysis of the data.

CLASSIFICATION OF LEXICAL FLUENCY UNITS

According to Ushigusa (2008), the major guidelines for differentiating between types of idiomatic lexical fluency units and literal lexical fluency units are compositionality of meanings and fixedness of syntactic structures. When the meaning of a lexical fluency unit was explicable solely based on the literal meaning of each word in the unit, this lexical fluency was considered literal (for example, *talk about*). When the meaning of the unit was not explicable, it was considered idiomatic (for example, *spill the beans*).

Ushigusa (2008) used dictionary meaning of the words to show whether the lexical fluency units were literal or idiomatic. The concern of whether an expression is fixed or variable is another common principle in defining an idiomatic lexical fluency. When an expression is unfixed, it is likely to be a non-idiomatic expression. For instance, *catch* (+ transportation), in which variable expressions such as a car, a taxi, or a train can be used for the slot for transportation, is not an idiomatic expression, but a collocation. When an expression is fixed, it is likely to be an idiomatic expression. For instance, *kill time* is fixed and no substitution is allowed for any slot within this unit. *Time is killed* is not a suitable form either.

The current study's procedure for classification of lexical fluency was based on Foster (2001) and Ushigusa (2008). With respect to standardisation, in this study, Foster's (2001) Lexical Fluencies was employed to determine the relationship between the total number of lexical chunks and the total number of words in the responses. After the data were collected, examinee response data were analyzed for temporal variables using PRAAT and Transcriber

software. Then, their responses to the OEPT were transcribed and different types of lexical fluency items were categorised and counted. Finally, the forty participants' OEPT scores were rated and the three sets of variables of the study were copied from the Excel spreadsheet onto the input statement of the 17th version of SPSS. The SPSS software was used for mean, standard deviation, and Spearman correlation analysis of the data.

RESULTS AND DISCUSSION

In order to compare groups at different OEPT levels, mean values are used to indicate variability. Specifically, a standard deviation, which is the variability of the values with respect to the average value, is used to indicate the degree to which a group is homogeneous or heterogeneous. Different OEPT levels used in this study are represented in Table 1. There were only three examinees for the OEPT score level of 35 and 55 in this study, these examinees were collapsed into level 40 and 50, respectively because no interpretation would be possible in terms of general characteristics of level 35 and 55 speakers with such a small number of examinees. The new score levels and number of participant are presented in Table 1.

TABLE 1. New OEPT score levels as compared to actual levels

	OEPT score Level	Number of Examinees	OEPT Score levels Used in the Study
Lowest proficiency	35	3	40(14)
	40	7	
	45	10	45(13)
	50	8	
	55	3	
Highest Proficiency	60	0	50(13)

ANALYZING EACH TEMPORAL MEASURES OF FLUENCY

According to Wood (2012), all speaking fluency studies concur on the type of temporal variables to be tracked. Temporal measures of fluency consist of two types of measures: phonation-based temporal measures and pause-based temporal measures. Figure 2 is a histogram of the mean values associated with each OEPT level in which the relationship between total response time and the OEPT scores is presented as utterly linear. As illustrated in Figure 2, measures based on phonation are mainly related to proficiency which include total response time (TR), phonation time ratio (PR), speech rate by syllables (SRS), speech rate by word (SRW), articulation rate (AR), and mean length of run (MLR). Among which TR, SRS, and SRW have the most correlation to the OEPT score level. Likewise, Figure 2 presents measures based on pauses which are mainly related to non-fluency; they include silent pause time ratio (SPR), average length of pauses (ALP), and mean number of pauses per minute (MP).

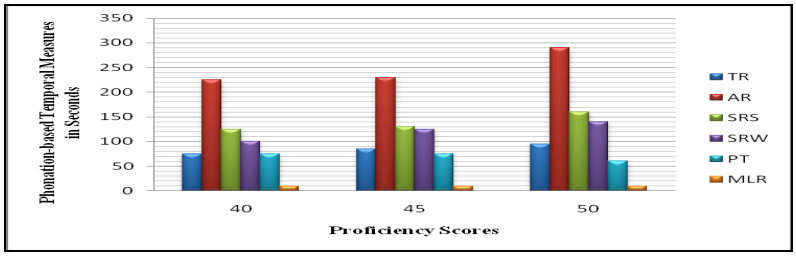

FIGURE 2. Correlation of proficiency scores and phonation-based temporal measures. TR= Total Response Time, AR= Articulation Rate, SRS= Speaking Rate by Syllabus, SRW= Speaking Rate by Words, PT= Phonation Time Ratio, MLR= Mean Length of Run

ANALYZING EACH SUBSET OF PREFABS

As mentioned in the preceding section, this study utilises Ushigusa's (2008) classification of prefabs. The use of different subsets of lexical fluency units was examined mainly because they were hypothesised to correlate with the temporal measures of fluency that appear largely linear in the previous section. There are three levels of descriptions in this section, as represented in Figure 3. The first level is the frequency of all lexical fluency units, the second level is the frequency of idiomatic lexical fluency units and literal lexical fluency units that are subsumed under the first level, and the third level is the frequency of all smaller lexical fluency units subsumed under the intermediate level.

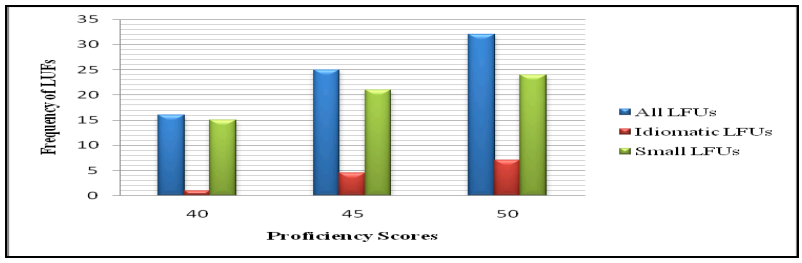

FIGURE 3. Correlation of proficiency scores and all and two main subcategories of LF

The following subsections discuss the means, standard deviations, and ranges between the maximum and minimum values by examining the ratios of the use of lexical fluency units to the total numbers of words produced in the responses.

CORRELATIONS BETWEEN TEMPORAL MEASURES OF FLUENCY AND OEPT SCORES

This part mainly addresses the first question of the study which concerns the relationship between different OEPT scores and temporal measures of Iranian teachers' performance. Table 2 shows that some OEPT scores and temporal measures of fluency are strongly correlated. OEPT scores have negative correlations to the following: -.18 to phonation time ratio (PR), .01 to the average length of pauses (ALP), and -.03 to the mean length of run (MLR). Likewise, OEPT scores have positive correlations to the following: .38 to articulation rate (AR), .46 to speaking rate by syllable (SRS), and .51 to speaking rate by word (SRW). Among these negative and positive correlations only SRS, SRW, AR are significant at the.05 level. MP is not significant.

TABLE 2. Correlation between Temporal Measures of Fluency and OEPT Scores

TM	SCORE
TRT	.06
SRS	.46*
SRW	.51**
PR	-.18
AR	.38*
SPR	.18
MLR	-.03
MP	**.28**
ALP	-.01

Towell et al. (1996) argue that speaking rate (SR) encompasses the workings of the Levelt's model that consists of the three phases: conceptualiser, formulator, and articulator. If the overall speaking rate increases, it is in all the three elements that more declarative knowledge is argued to be proceduralised by the learner. The proficiency score is a measure

to assess, not only the degree of fluency as a temporal variable, but also other factors including syntactic knowledge (Towell et al., 1996). It follows that the proficiency score is likely to represent the workings of the three phases as a whole. In the present study, SR has the strongest correlation to the OEPT score among all temporal measures of fluency. If the OEPT score represents the working of the three phases, this strong correlation of SR may be an indication that a more proficient speaker is proceduralizing more declarative knowledge in all three phases of the conceptualiser, formulator, and articulator.

CORRELATIONS BETWEEN TEMPORAL MEASURES AND LEXICAL FLUENCY UNITS

With respect to the second question of the study, there is a significant relationship between lexical fluency (in number and type) of foreign language teachers and their degree of temporal fluency. To espouse this claim, refer to the bold numbers in the Table 3 Matrix.

TABLE 3. Simple correlations between Temporal Measures of Fluency and the use of lexical fluency units

LFU	TRT	SRS	SRW	PR	AR	SPR	MLR	MP	ALP
A.LF	-.17	**.32**	.39*	-.06	.19	.06	.02	.13	.01
ILF	.08	**.22**	**.22**	-.09	**.22**	.09	.10	-.00	.12
LLF	**-.32**	**.30**	.39*	-.01	.13	.01	.02	.13	-.04
OIE	.12	.18	**.20**	-.04	.17	.04	.11	-.01	.07
LVP	**-.35**	-.00	.04	**-.30**	.17	**.30**	-.11	.01	**.30**
COLL	-.54**	**.26**	**.30**	-.18	.18	.18	**-.31**	.39*	.01
LFSW	**.25**	.05	.10	**.20**	-.02	**-.20**	.40*	**-.29**	-.13
LFDM	.04	**-.25**	-.18	.04	-.19	-.04	-.10	-.10	.14
ID E	-.04	**.24**	**.20**	-.15	**.22**	.15	.08	.00	.17

List of abbreviations: Temporal Fluency (TF), Lexical Fluency (LF), Oral English Proficiency Test (OEPT), Total Response Time (TRT), Speech Rate by Syllabuses (SRS), Speech Rate by Words (SRW), Articulation Rate (AR), Phonation-Time Ratio (PR), Mean Length of Runs (MLR), Silent Pause Time Ratio (SPR), Average Length of Pauses (ALP), Mean Number of Pause (MP), Lexical Fluency Units (LFUs), Literal Lexical Fluency Units (LLFUs), Phrasal Verbs (PVs), Verbal Phrases (VPs), Collocations (COLL), Lexical Fluency Small words (LFSWs), and Lexical Fluency Discourse Markers (LFDMs).

Table 3 shows positive correlations between different types of lexical fluency units and temporal measures of fluency that are mainly based on utterances. Strong correlations were found between COLL and TRT (r=.54), MP and COLL (r=.39), between MLR and LFSW (r=.40), between LLF and SRW (r=.39), and a lot of weak correlations which are bolded. These are all significant correlations. However, total response time (TR) does not correlate with the use of all LFUs (-.05).

To sum up, this section has shown that strong and moderate correlations were found between all lexical fluency units (the largest subset category of prefabs of the study) and temporal measures of fluency. This result might indicate that the greater proceduralisation associated with the use of prefabs, which are syntactic as well as lexical constructions recurrently used regardless of idiomaticity, have a high likelihood of being related to a greater degree of fluency.

CORRELATIONS BETWEEN LEXICAL FLUENCY UNITS AND OEPT SCORES

This section indirectly answers the third question of the study which states that lexical fluency is more related to the proficiency level of EFL speakers than temporal fluency (TF). To shed light on this question, the bolded items in Table 3 which have significant and moderate correlations were found between the use of all lexical fluency units and the OEPT scores. The use of 'all lexical fluency units' is strongly correlated with OEPT scores (r=.61). OEPT scores have also strong correlations to the following: .61 to idiomatic lexical fluency units (Id.LFU), .52 to literal lexical fluency units (Lit.LFU), and .60 to other idiomatic lexical fluency units. The use of lexical fluency small words (LFSW), the use of lexical fluency discourse markers (LFDM), and the use of literal verbal phrase (LVP) do not appear correlated to OEPT scores; and collocations (COLL) have moderate correlations.

TABLE 4. Correlation coefficient between the use of lexical fluency units and OEPT score table

LFUs	SCORE
ALL. LF	.65**
ILF	.61**
LLF	.52**
OIE	.48**
LVP	.13
COLL	.35
LFSW	.27
LFDM	.26
IDE	.60**

As for the comparison between the use of idiomatic LFUs and literal LFUs, an interesting difference appeared to be found with respect to their significant correlations to OEPT scores: r=.61 for the former is larger than .52 for the latter. However, the stability of this observed pattern might not be very certain due to the small number of the use of idiomatic LFUs. The correlation between the use of 'all lexical fluency units' and the OEPT proficiency score is strong (r=.65). This strong correlation might indicate that there is a possible large overlap between the use of all lexical fluency units and the OEPT proficiency score. Because the all LFUs is a large category that includes many variables, it is likely to overlap with other categories. The use of all lexical fluency units, which includes literal lexical fluency units that are syntactically more variable than idiomatic lexical fluency units, necessarily includes vocabulary phenomena that are associated with syntactic proceduralisation (Towel et al 1998). Therefore, the overlap between the use of all lexical fluency units and the OEPT proficiency score might be represented partly by syntactic knowledge as well as lexical knowledge. Finally, the answer to the third question strongly supports all the presumptions of doing this research particularly Lexical Fluency Model (LFM) which was described in the previous section. The three variables of the study are really intertwined. However, on the one hand, as the correlation matrix represents, LFUs and TF are highly correlated. On the other hand, both of them have strong correlation to the oral proficiency test. Therefore, it is discernible that incorporation of more LFUs in speech results in higher TF, and they both can increase overall speaking proficiency.

In this study, lexical fluency units (LFUs) are considered to be linguistic productions. LFUs can thus account theoretically for brisk articulation of words. The current study attempted to examine how the lexical fluency units and overall speaking fluency are interrelated. Research question 3 addressed the relationship between the use of lexical fluency units (LFUs) and temporal measures of fluency. Finding strong and significant correlations, the study has reached the conclusion that a greater degree of proceduralisation, which creates a greater degree of temporal fluency, is associated with the use of the LFUs. This study has addressed three research questions. The results generally indicated that higher values on the temporal fluency measures or lower values of temporal non-fluency measures corresponded to higher OEPT scores and that the examinee group's temporal performances became more homogeneous as the OEPT scores increases. With respect to LFUs, six categories, including all the idiomatic categories of the study, were not used frequently enough to show a pattern that could be regarded stable. The groups became more homogeneous as the OEPT scores increases with respect to the use of all LFUs as well as the use of their subset categories: literal LFUs and collocations.

As indicated by their strong and significant correlation, the study found a relatively large overlap between the use of 'all LFUs' and the OEPT proficiency score. This study argued that the overlap might be represented by lexical knowledge or verbal dexterity. The study also found the very close relationships between the temporal measures of fluency and the OEPT proficiency scores in which speaking rate by words had the strongest correlation

and speaking rate by syllables and articulation time had the second strongest correlations with the proficiency scores among all temporal variables. The strong and significant correlation associated with speaking rate might support Towell et al.'s (1996) claim that this measure represents the workings of the entire speech production model, which is most likely to be related to general oral proficiency score. Assuming syntactic and lexical knowledge is a large part of general oral proficiency, this study might support Towell et al.'s argument that the development of proceduralisation of lexical and syntactic knowledge within the formulator is associated with these variables. Pawley and Syder (1983) equate the native speaker's linguistic competence to a "phrase book with grammatical notes" (p. 220), suggesting that native-like fluency is a function of extemporaneous retrieval of the available LFUs. There is no direct way to identify whether there is such a repertoire of prefabricated sequence of words in the human mind or not. However, results of this study find strong and significant correlation between three temporal measures of fluency (SRW, SRS, AR) and the use of identified LFUs of the study might indirectly show that a more fluent speaker has a larger number of prefabs readily available in his / her mind. A greater degree of proceduralisation associated with the use of prefabs, which are syntactic as well as lexical units recurrently used regardless of idiomaticity, has a high likelihood of being associated with a greater degree of temporal measures of fluency. Therefore, this great degree of proceduralisation is likely to be indicated in the strong correlations that this study found between the use of all LFUs and the aforementioned variables playing a major role.

Additionally, the stronger correlations found for the idiomatic LFUs might indicate that they are associated with increases in temporal fluency as well as in the proficiency score more so than are the literal LFUs (r=.61** for the former was larger than .52** for the latter). The above comparison between idiomatic LFUs -syntactically more fixed- and literal LFUs -syntactically more variable- might support Underwood's (2004) finding that L2 speakers process idiomatic LFUs holistically; as a result, their retrieval is brisk and impromptu. Likewise, Jiang and Nekrasova's (2007) findings show that L2 speakers process syntactically-fixed LFUs holistically without resorting to syntactic analysis which results in rapid process of idiomatic or syntactically-fixed LFUs. Moreover, Ushigusa's (2008) findings exactly come along with this study that ILFUs had more correlation than LLFUs to overall speaking fluency. The use of literal LFUs, which are argued to be stored and retrieved as a prefabricated pattern, appears to be correlated with temporal fluency significantly and at least moderately.

CONCLUSION

Following Ushigusa (2008) and Wood (2012), the present study has shown that speaking fluency in English as a second language is strongly related to and facilitated by the use of lexical fluency units (LFUs). According to Durrant (2008), while LFU has always been of some interest to teachers and learners, the last three decades have witnessed a far more concerned focus on formulacity, chiefly motivated by the ideas that formulas are essential to attaining native like fluency and selection and that they may play a key role in the acquisition process. Two theory-driven assumptions were fundamental in this study: (1) Proceduralised use of prefabs minimises planning time, leading to a decrease of silent pauses and (2) proceduralised use of prefabs maximises oral production of fluent sequences of words between silent pauses. These assumptions were mainly driven by Levelt's (1989) speech production model. In order to justify how humans can produce speech rapidly enough to take part in typical communication, Levelt's incremental production with parallel processing provides implicit mechanisms by which speakers produce language while deciding what to

say simultaneously. Parallel processing explains that the three phases of conceptualisation, formulation, and articulation can work at the same time on different aspects of sentential or phrasal construction.

Conclusions that might be drawn from the study are invaluable for foreign language learners and teachers. First, the strong and significant correlation between participants' temporal fluency and proficiency scores clearly attest that teachers can aid learners to bypass dysfluency phenomena; for example, by explaining to them some temporal variables (falls start, repetition, pauses, and so on), conversation strategies, and the most important of all, by teaching lexical fluency units, which can be retrieved extemporaneously from learners mind. Second, the significant correlation between temporal fluency and lexical fluency undoubtedly suggests that having a vast amount of lexical fluency units in mind empowers learners to reach their potentials; therefore, teachers can take important steps by choosing appropriate lexical fluency units according to their correlations, which have been found in this study, frequency, and relevance. Finally, as the correlation matrix illustrates, the three variables of the study have strong and significant colorations which endeavor to indicate that lexical fluency units play an important role on overall speaking fluency of teachers; at the same time, they diminish dysfluency and increase proficiency.

IMPLICATIONS OF THE STUDY

While the temporal measures of fluency are objectively determined and the measuring of ratios of identified LFUs in an item response are mostly based on non-perceptual decisions, the OEPT score was largely based on raters' perceptual decisions made with the use of holistic guidelines as a rubric. This emphasis on perception is found in some descriptors of the OEPT scoring guideline; for instance, in OEPT's Level 35 proficiency, which includes descriptors such as "Responses tend to be repetitive and incomplete" and "Attempts to communicate ideas are generally unsuccessful". Despite such differences between the perceptual measures of the OEPT score and the objective temporal measures of fluency, this study found significant correlations between the OEPT score and most of the temporal variables. These correlations might be manifestations of the possibility that oral proficiency determined by raters' perceptual judgments include their judgment on the temporal factors of fluency.

Furthermore, enhanced proceduralisation of lexical and syntactic knowledge associated with LFUs theoretically leads to a higher degree of temporal measures of fluency. However, this relationship between the temporal measures of fluency and the use of LFUs does not provide many pedagogical implications because the temporal measures of fluency cannot be determined easily by perception. These temporal measures require computer software such as PRAAT or Transcriber and the process of counting numbers of pauses, syllables, and words. However, the experimentally-proven intimacy between the temporal measures of fluency and the perceptually determined OEPT proficiency score opens up the possibility for the temporal measures of fluency to provide pedagogical implications. If, for instance, an innovative teaching method successfully increases teachers' temporal measures of fluency, then their proficiency scores necessarily increase.

A possible criticism against the use of temporal measures of fluency is that they do not reflect 'real fluency.' This criticism might show that some components, such as coherence of utterances or qualities of pronunciations, cannot be measured by temporal measures of fluency. It might ask 'Is faster speech better? Is it good to talk in a mechanical way?" This study's result does not propose to teach students how to speak quickly in a mechanical manner. Instead, this study proposes to teach students how to increase abilities in all aspects of global proficiency including grammar, vocabulary, coherent speech, and

pronunciation. This study has proven that there is close relationship between temporal measures of fluency and the OEPT proficiency score.

Likewise, it is less likely that speaking rapidly causes speaking proficiently. It is easier to conjecture that in order to learn how to speak fast, the learner would have to increase abilities in all aspects of global proficiency. It is also easier to conjecture that once the learner increases the abilities in these areas, he / she would be likely to know how to speak faster when necessary. The ability to articulate rapidly and comprehensibly does not seem to be acquired unless the overall proficiency has been acquired. Rapid and comprehensible speech should involve all phases of speech production; not only the ability to speak quickly in the articulation phase, but also the ability to structure utterances with LFUs in the formulation phase and the ability to plan to speak meaningfully and coherently in the phase of conceptualisation.

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