



## The Relationship between L2 Lexical Knowledge and Phonological Memory in Adult Male and Female EFL Learners at Different Language Proficiency Levels

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### Abstract

The current study examined the relationship between phonological memory (PM) and L2 lexical knowledge among male and female adults in an EFL context. The number of participants was 368 (180 males and 188 females). Based upon the scores obtained from the Quick Placement Test, the participants were assigned to three levels of language proficiency, i.e. beginner, lower intermediate, and advanced. PM was measured by nonword repetition (NWRP) and nonword recognition (NWRC) tests, and L2 lexical knowledge was assessed by Vocabulary Levels Test (VLT) in the first week of an intensive six-week English course. Afterward, Pearson correlations were conducted through SPSS 21. The findings showed that adult male/female EFL learners' L2 lexical knowledge and PM tests were moderately high correlated in the beginning and lower intermediate levels of language proficiency.

**Keywords:** Phonological memory, lexical knowledge, language proficiency, adult EFL learners.

### Introduction

One of the most thoroughly investigated factors relating to individual differences in cognition is working memory (WM). Working memory (WM) refers to the "temporary storage and manipulation of information that is assumed to be necessary for a wide range of complex cognitive activities"<sup>1</sup>. Baddeley's model of WM, as one of the most influential ones, comprises of the central executive, the phonological loop, the visuo-spatial sketchpad, and the episodic buffer<sup>1</sup>. The phonological loop deals with the storage of verbal, speech-based material<sup>2</sup>. In addition, the phonological loop supports "language learning including vocabulary development, fluency, and some measures of comprehension"<sup>3</sup>. Phonological loop has also been interchangeably referred to as phonological memory (PM)<sup>4</sup>.

A number of studies have shown that PM has a key role in L2 lexical learning. Some L2 studies revealed that PM predicts the ability of both children and adults to learn new L2 vocabulary<sup>5,6</sup>. This account has been further supported by findings from studies which revealed significant relationships between nonword repetition (NWRP), nonword recognition (NWRC), and L2 lexical knowledge<sup>3,7,8</sup>. Furthermore, the studies probing adults found no significant correlation between the PM tests and the participants' level of language proficiency<sup>9-11</sup>.

English language is regarded as an international language<sup>12-16</sup>. In addition, lexical knowledge is regarded indispensable for learning English. There have been two views on assessing lexical knowledge, quantitative and qualitative. The quantitative aspect of lexical knowledge, also called breadth or size of lexical knowledge, is related to the number of words that language learners know<sup>17</sup>. The qualitative aspect of lexical

knowledge (depth of knowledge), on the other hand, refers to "how well the language learner knows a word"<sup>18</sup>. It was emphasized that it is not feasible to design a single study that could capture all of the word knowledge categories<sup>19</sup>. This study viewed lexical knowledge from a quantitative point of view that is vocabulary size.

There are some differences in language perception and performance of males and females<sup>19</sup>. There have also been controversial findings in studies which have investigated the relationship between gender and memory test performance in adults. Some studies reported a significant relationship and other studies found no relationship between gender and memory test scores<sup>20-22</sup>. The present study aimed at examining the extent to which the L2 lexical knowledge and PM tests (NWRP and NWRC) associate in three language proficiency levels for male/female EFL learners. Therefore, the following question was addressed:

To what extent do adult male/female EFL learners' phonological memory capacity and L2 lexical knowledge correlate in different levels of language proficiency?

### Methodology

**The Pilot Study:** Prior to the present study, a pilot study was conducted i. to investigate the reliability of the test instruments, and ii. to determine if data collection procedures were clear and appropriate. The pilot study involved Oxford Quick Placement Test (QPT), NWRC test, NWRP test, grammar test, and Vocabulary Levels Test (VLT). The participants for the pilot study were 76 Iranian EFL learners (40 males and 36 females). All participants were adult English learners whose age ranged

from 18 to 27. The pilot study was carried out during the summer session of 2013 at three English language institutes in Shiraz and Estahban, located in Fars province, Iran. The data collection was conducted in two sessions. First, the participants were asked to answer QPT v.1 in 30 minutes<sup>23</sup>. Based the QPT band scores, the participants were assigned to different language proficiency levels; 21 were assigned to the beginner group, 14 to the elementary group, 18 to the lower intermediate group, 12 to the upper intermediate group, and 11 to the advanced group. Since in the present study three levels of language proficiency were intended, the participants from the elementary and upper intermediate groups were excluded. Then, both NWRC and NWRP tests were administered in language laboratories since headphones were needed to allow the participants to listen to sequences of the recorded nonwords. The allocated time for the NWRC and NWRP tests were 15 and 5 minutes respectively. In the second session, the participants answered the grammar section of the Oxford Placement Test (OPT) v.1 in 50 minutes. Afterwards, they answered the VLT in 50 minutes. Then, Cronbach's alphas were calculated for the tests. The scores gained in QPT, the grammar test, and the VLT enjoyed the coefficient alphas of .84, .81, and .92 respectively. In addition, the sores obtained from the NWRC and NWRP tests had the coefficient alphas of .87 and .90 respectively. The obtained coefficient alphas showed that the test scores were highly reliable.

**The Main Study: Participants:** The participants were selected from Iranian adult EFL students. The present study took in 368 participants (126 beginners, 122 lower intermediate and 120 advanced learners of English). The number of male and female participants was 180 and 188 respectively (table-1). To assess their level of proficiency, all the participants were given the QPT<sup>24</sup>.

**Table- 1**  
**Number of Male and Female Participants in Each Proficiency Level**

Proficiency Level	Beginner	Lower Intermediate	Advanced	Total
Males	60	60	60	180
Females	66	62	60	188

**Instruments: Nonword Repetition (NWRP) Test:** NWRP test is one of the popular tests of PM capacity (PMC) where participants have to repeat nonwords. Nonwords are of different lengths and do not exist in the given language but correspond to its phonotactic rules. Following the studies carried out before, the participants in the present study heard a list of 1-syllable nonwords and were asked to repeat them<sup>3,9</sup>. There were four lists at each of four lengths: three, four, five, and six words. The nonwords were taken from a stimulus pool of nonwords<sup>25</sup>. The highest possible score was 22 correct phonemes.

**Nonword Recognition (NWRC) Test:** Two presentations of a list of nonwords were presented to the participants and afterwards, the participants decided whether they were the same or different<sup>9, 25</sup>. Four lists were used at each of four lengths: four, five, six and seven items. The maximum possible score for this test was 16 correct recognitions.

**Quick Placement Test:** "QPT is a test of English language proficiency developed by Oxford University Press and Cambridge ESOL to give teachers a reliable and time-saving method of finding a students' level of English"<sup>26</sup>. QPT includes 60 items and takes 30 minutes to complete. The SEM of the test is around 4 and its reliability is close to 0.9<sup>26</sup>. Since in the present study the number of the participants was high and there was time limitation for the researcher to collect the data, QPT believed to be the most practical test to assess the participants' proficiency level. The version 1 of QPT was used to ascertain the participants levels of language proficiency. A summary of the test levels and band scores are depicted in table-2.

**Table-2**  
**QPT Band Scores**

Level	Band Score (out of 60)
Beginner	0-17
Elementary	18-29
Lower Intermediate	30-39
Upper Intermediate	40-47
Advanced	48-54
Very advanced	54-60

**Vocabulary Levels Test (VLT):** The English vocabulary test chosen for this study was the Vocabulary Levels Test (VLT)<sup>27</sup>. It contained 2000-, 3000-, the University Word List (UWL) level, and 10,000-word frequency levels. In VLT, there are 18 test items at each level and thus a total of 90 items. The time allocated to the test was 50 minutes.

**Data Collection Procedures:** The participants' classes were held for six weeks and each session lasted for two hours. The participants attended the English classes four sessions a week. Based on the scores obtained from the QPT, the participants were assigned to one of the three proficiency groups (beginner, lower intermediate, and advanced). The band scores for the beginners, lower intermediate, and advanced levels are 0 to 15, 24 to 30, and 48 to 60 respectively<sup>9</sup>. The NWRP, NWRC, and the vocabulary tests were measured during the first week of the English course. The participants took the NWRC and NWRP tests within 15 and 5 minutes, respectively. Afterward, the participants answered the VLT in 50 minutes.

**Data Analysis:** Shapiro-Wilk test which is one of the most powerful normality tests was used to ensure the normality of the data distribution<sup>28,29</sup>. Therefore, the data from the NWRP test, NWRC test, and VLT were entered into SPSS (v.21)<sup>30</sup>. Afterward, Pearson correlations were investigated for the PM tests, and the VLT scores. Significance level was set at  $p < .05$ .

### Results and Discussion

Shapiro-Wilk test was used to make sure that the distribution was normal (see tables-3 and 4).

In all proficiency groups, the significance values show that there is normal distribution since the p-value is more than 0.05. Table 5 shows the descriptive statistics of the male participants.

As table-5 depicts, the advanced group had the highest mean score on both NWRP test (M= 15.70, SD=1.97) and NWRC test (M= 11.05, SD=1.5). The maximum score on the NWRP test was obtained by the advanced group (Max= 20). Both the lower intermediate and advanced groups gained the highest score in the NWRC test (Max= 14). Table-6 shows the mean (Ms), standard deviations (SDs), and ranges of the scores of the VLT, NWRP and NWRC tests for the female participants.

**Table-3**  
**Test of Normality for All Male Groups**

	Shapiro-Wilk Test					
	Beginner		Lower Intermediate		Advanced	
	statistic	Sig.	statistic	Sig.	statistic	Sig.
Scores on the VLT	.97	.21	.97	.13	.95	.20
Scores on the NWRP	.96	.22	.94	.18	.95	.10
Score on the NWRC	.95	.19	.94	.14	.92	.11

**Table- 4**  
**Test of Normality for All Female Groups**

	Shapiro-Wilk Test					
	Beginner		Lower Intermediate		Advanced	
	Statistic	Sig.	statistic	Sig.	statistic	Sig.
Scores on the VLT	.95	.70	.96	.24	.94	.32
Scores on the NWRP	.96	.12	.95	.16	.97	.27
Score on the NWRC	.95	.24	.94	.18	.95	.13

**Table-5**  
**Descriptive Statistics of Male Participants**

Variables	Beginner Group				Lower intermediate Group				Advanced Group			
	M	SD	Max	Min	M	SD	Max	Min	M	SD	Max	Min
VLT	15.8	4.54	24	8	34	4.32	45	28	60.3	7.51	76	50
NWRP Test	14.77	2	19	11	14.3	1.69	19	11	15.70	1.97	20	12
NWRC Test	9.28	1.83	13	6	9.65	1.51	14	6	11.05	1.5	14	8

As table-6 shows, the advanced group had the highest mean score on both NWRP test (M= 15.26, SD=1.43) and NWRC test (M= 11.35, SD=1.64). To answer the first research question, Pearson correlations between PM tests and VLT were calculated for the male participants at different levels of language proficiency. Table-7 depicts the correlation coefficients between PM tests (NWRP and NWRC) and VLT for male participants in the beginner, lower intermediate, and advanced level participants.

Table-7 shows that NWRP test was correlated with VLT for beginners ( $r = .57, p < .01$ ), lower intermediate ( $r = .52, p < .01$ ), and advanced level participants ( $r = .40, p < .01$ ). NWRC test was also correlated with VLT at all proficiency levels (beginner:  $r = .62, p < .01$ ; lower intermediate,  $r = .50, p < .01$ ; advanced,  $r = .38, p < .01$ ). The correlation coefficients show a moderately strong relationship for the three tests. The highest correlation

between VLT and NWRP test was that of beginners,  $r = .57, p < .01$ . Besides, the beginners' scores on VLT enjoyed the highest correlation with NWRC test,  $r = .62, p < .01$ . Table 8 depicts the correlation coefficients between PM tests (NWRP and NWRC) and VLT for the female participants in the beginner, lower intermediate and advanced groups.

Table-8 shows that NWRP test was correlated with VLT for beginners ( $r = .59, p < .01$ ), lower intermediate ( $r = .48, p < .01$ ), and advanced participants ( $r = .36, p < .01$ ). NWRC test was also correlated with VLT at all proficiency levels (beginner:  $r = .45, p < .01$ ; lower intermediate,  $r = .53, p < .01$ ; advanced,  $r = .41, p < .01$ ). The highest correlation between VLT and NWRP test was that of beginners,  $r = .59, p < .01$ . Besides, the scores of the lower intermediate group on VLT had the highest correlation with NWRC test,  $r = .53, p < .01$ .

**Table- 6**  
**Descriptive Statistics of Female Participants**

Variables	Beginner Group				Lower intermediate Group				Advanced Group			
	M	SD	Max	Min	M	SD	Max	Min	M	SD	Max	Min
VLT	15.52	3.51	23	9	36	4.58	45	26	61.68	7.08	72	51
NWRP Test	15.09	1.64	18	11	14.83	1.91	20	12	<b>15.26</b>	1.43	<b>20</b>	11
NWRC Test	10.59	1.73	13	7	10.02	1.42	13	8	<b>11.35</b>	1.64	<b>15</b>	8

**Table- 7**  
**Pearson Correlations between PM Tests and VLT for Male Participants**

Variable	Beginner Group			Lower Intermediate Group			Advanced Group		
	1	2	3	1	2	3	1	2	3
1. VLT	—			—			—		
2. NWRP	<b>.57**</b>	—		<b>.52**</b>	—		<b>.40**</b>	—	
3. NWRC	<b>.62**</b>	<b>.52**</b>	—	<b>.50**</b>	<b>.40**</b>	—	<b>.38**</b>	<b>.50**</b>	—

\*\* $p < .01$

**Table- 8**  
**Pearson Correlations between PM Tests and VLT for Female Participants**

Variable	Beginner Group			Lower Intermediate Group			Advanced Group		
	1	2	3	1	2	3	1	2	3
1. VLT	—			—			—		
2. NWRP	<b>.59**</b>	—		<b>.48**</b>	—		<b>.36**</b>	—	
3. NWRC	<b>.45**</b>	<b>.48**</b>	—	<b>.53**</b>	<b>.80**</b>	—	<b>.41**</b>	<b>.61**</b>	—

\*\* $p < .01$

The results are in line with some previous studies<sup>3,7,8</sup>. For both male and female beginners, the correlations between the scores on NWRP and VLT were higher than those of the lower intermediate and advanced learners. The results imply that lexical knowledge was more strongly related to PMC for beginning and lower intermediate learners than for advanced learners. It can be concluded that the lexical items involved in the VLT were generally unfamiliar to the beginner and lower intermediate learners because they had most likely lower proficiency levels in the L2. The results revealed that adult EFL learners in the lower levels of language proficiency relied on PMC more heavily so as to gain the long-term learning of the lexical items. Conversely, advanced learners were more likely to be familiar with the lexical items and it could cause the contributions from PM to become less influential.

## Conclusion

The present research aimed at investigating the relationship between PMC and the adult male/female EFL learners' lexical knowledge. The finding of this study showed that PM and L2 lexical knowledge were correlated moderately high in beginning and lower intermediate levels of language proficiency. Additionally, the design of the current study was correlational and the causal mechanisms should be uncovered in the future research to show the existing relationships among factors. Future research should also examine the longitudinal development of vocabulary knowledge, rather than just lexical knowledge at one level. Finally, since this study investigated the lexical knowledge from a quantitative point of view, further research should be carried out to delve into the link between the PM tests and qualitative aspect (vocabulary depth) of lexical knowledge.

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