We used the repeated measures MANOVA to measure overall task type and 'number of encounters' effects on each of the four degrees of word knowledge, and interaction between the two main variables. The differences between task types were measured in each 'number of encounters' condition separately by ANOVA. The differences between 'number of encounters' conditions in each task type were measured by the repeated measures ANOVA. Additionally, we used the post-hoc Tukey Tests to analyse pairs of data when ANOVA results showed significant differences.

IV Results

1 Descriptive statistics

Table 3 presents the descriptive data on the active, passive recall and active, passive recognition tests respectively. Figures 1–4 show the same results graphically. We can see that in all four degrees of word knowledge:

Table 3. Word retention scores per degree of word knowledge. (Maximum 10).

Task type	Mean (Std)	Mean (Std)	Mean (Std)
Active recall			
	2–3 times	*4–5*	*6–7*
I+Fs	0.96 (1.10)	1.46 (1.68)	3.32 (2.18)
F	0.24 (0.50)	0.14 (0.50)	0.30 (0.52)
	6 and 9 times	*12 and 15*	*18 and 21*
R	0.16 (0.38)	0.20 (0.40)	0.62 (0.66)
Passive recall			
	2–3 times	*4–5*	*6–7*
I+Fs	1.90 (1.52)	2.50 (2.04)	4.34 (1.80)
F	1.06 (0.86)	1.20 (1.14)	1.94 (1.66)
	6 and 9 times	*12 and 15*	*18 and 21*
R	0.26 (0.58)	0.58 (0.80)	1.16 (0.90)
Active recognition			
	2–3 times	*4–5*	*6–7*
I+Fs	5.94 (2.20)	6.56 (2.04)	7.96 (1.68)
F	2.70 (1.60)	2.92 (1.62)	3.68 (1.76)
	6 and 9 times	*12 and 15*	*18 and 21*
R	2.70 (2.06)	3.78 (1.68)	4.04 (1.66)
Passive recognition			
	2–3 times	*4–5*	*6–7*
I+Fs	7.48 (1.94)	7.38 (2.06)	8.20 (1.66)
F	5.52 (2.28)	4.62 (2.04)	5.74 (2.36)
	6 and 9 times	*12 and 15*	*18 and 21*
R	3.80 (2.86)	3.90 (2.14)	4.48 (2.42)

Notes. R = Task condition: Reading + Focus on Form; F = Task condition: Reading + Focus on Form.
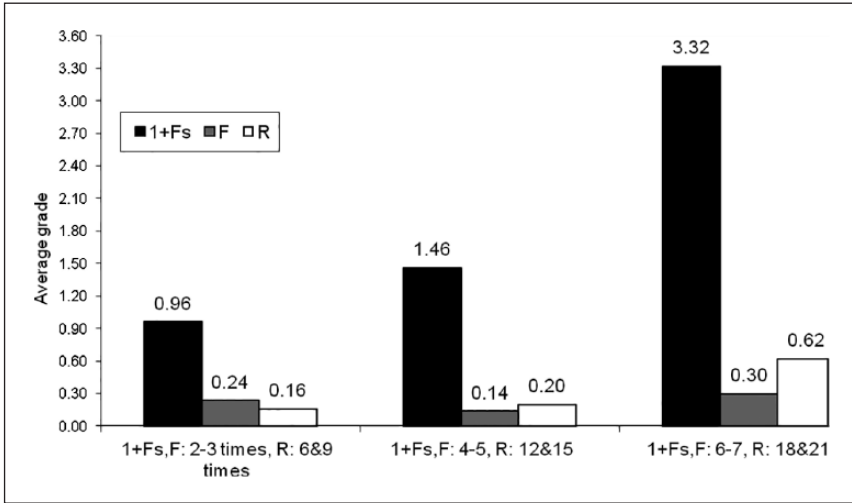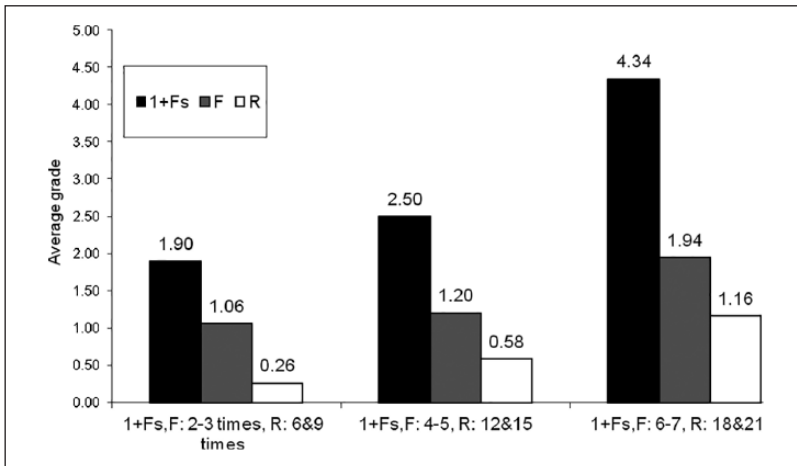
Figure 1. Active recall scores.

Figure 2. Passive recall scores.

- **1+Fs** (Reading with one exposure and subsequent Focus on Forms) yielded the highest retention scores within each 'number of encounters' condition;
- **F** (Reading with Focus on Form) required a considerably smaller 'number of encounters' than **R** (Reading only) to produce similar or better scores;
- there was a consistent increase in scores from more demanding to less demanding tests in all three 'task type' conditions; and
- in all four degrees of word knowledge, additional encounters with words affected the scores in the **1+Fs** condition more than in **F** or **R** conditions.
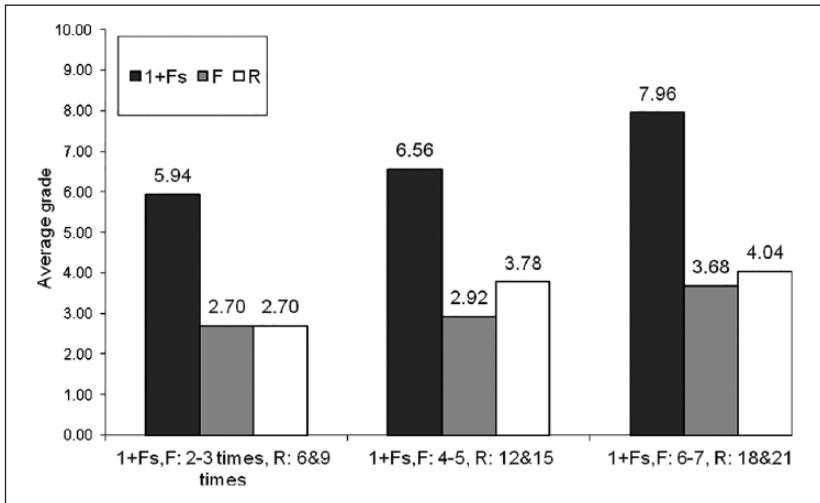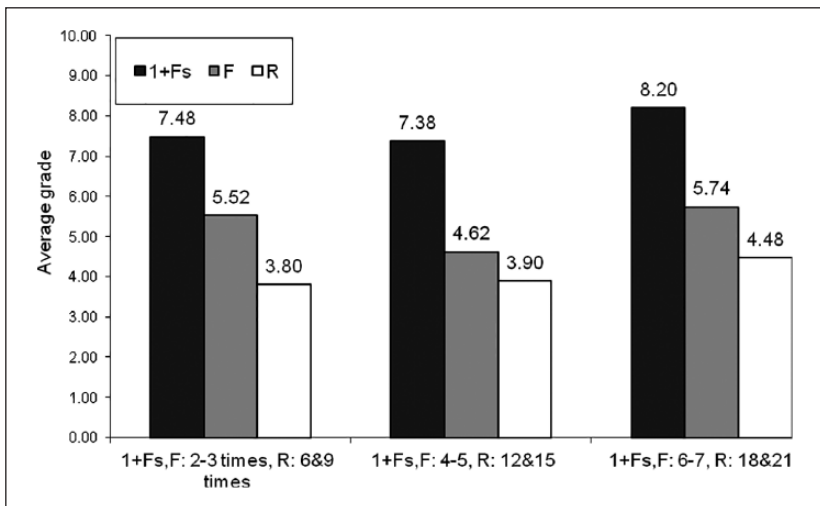
Figure 3. Active recognition scores.

Figure 4. Passive recognition scores.

In passive recognition, we can observe a weaker effect of additional encounters in all three task types than in active, passive recall and active recognition.

2 Inferential statistics

MANOVA showed a significant overall task type effect and a significant overall effect of the 'number of encounters' in each of the four degrees of word knowledge. It also showed

a significant interaction effect between the two variables in all the degrees of knowledge, except passive recognition (see Appendix 3 online).

Research question 1 asked whether there will be a significant difference in the number of retained words between three task conditions: Reading only, Reading + Focus on Form, Reading with one exposure + Focus on Forms. Tests of ANOVA comparing the three tasks revealed significant task type effects on each of the four degrees of word knowledge within each 'number of encounters' condition (see Appendix 3 online).

In order to determine where the above differences occurred, we used post-hoc Tukey Tests and compared pairs of task types within each of 'number of encounters' condition. As mentioned earlier, we compared identical 'number of encounters' for **F** and **1+Fs** and three times as many in the **R** condition. The results in Table 4 show the following:

1. For all four degrees of word knowledge, within each of 'number of encounters' condition, **1+Fs** produced significantly better results than **F** and **R.**
2. For active recall and recognition, **F** with 2–3, 4–5 and 6–7 encounters yielded similar results to **R** with 6&9, 12&15 and 18&21 respectively.
3. For passive recall, **F** with 2–3 encounters was significantly more beneficial than **R** with 6&9.
4. For passive recognition, **F** with 2–3 and 6–7 encounters yielded significantly better results than **R** with 6&9 and 18&21 respectively.

Table 4 shows that all the significant differences between pairs of task exhibited a very large effect size (Cohen *d* > 0.8 is considered to indicate a large effect size). These results (*p* values and Cohen *d* values) show how influential type of task is, at all degrees of word knowledge, irrespective of the 'number of encounters' with new words.

Research question 2 asked whether there will be a significant difference between the three 'number of encounters' conditions in each of the three ' task type' conditions. ANOVA with repeated measures showed that additional encounters with new words led to a significant increase in retention in all four degrees of knowledge in the **1+Fs** (Reading with one encounter in text + Focus on Forms) condition, in three degrees of knowledge (except *active recall*) in the **F** (Reading + Focus on Form) condition and in three degrees of knowledge (except *passive recognition*) in the **R** (Reading only) condition (see Appendix 2 online). This means that while each additional exposure to a new word in an exercise affects all degrees of knowledge, the same is not true for the other two conditions. For example, when learners read texts with a dictionary, meeting new words two times or seven times did not make a difference on a subsequent active recall test. When they read the texts without any enhancement of the target words (by means of dictionary or vocabulary exercises), meeting a word six or 21 times did not affect recognition of meaning.

In order to compare 'number of encounters' conditions with each other within each task type, we used the post-hoc Tukey–Kramer tests with the adjustment to a within- participant factor. Tables 5, 6 and 7 present the results which show that the most pronounced improvement in word learning that resulted from additional encounters occurred in the **1+Fs** condition. Unlike in **R** and **F** conditions, each increase in encounters with words in

Table 4. Task type effects per 'number of encounters' condition and degree of word knowledge. Mean differences, Post-hoc Tukey test results and effect sizes – Cohen d (in brackets).

Active recall

	R 6&9	F 2–3		R 12&15	F 4–5		R 18&21	F 6–7
R 6&9			R 12&15			R 18&21		
F 2–3	0.08		F 4–5	0.06		F 6–7	0.32	
1+Fs 2–3	0.8***	0.72***	1+Fs 4–5	1.26***	1.32***	1+Fs 6–7	2.7***	3.02***
	(1)	(0.8)		(0.9)	(1.5)		(1.6)	(1.9)

Passive recall

	R 6&9	F 2–3		R 12&15	F 4–5		R 18&21	F 6–7
R 6&9			R 12&15			R 18&21		
F 2–3	0.8*		F 4–5	0.62		F 6–7	0.78	
1+Fs 2–3	1.64***	0.84**	1+Fs 4–5	1.92***	1.3***	1+Fs 6–7	3.18***	2.4**
	(1.4)	(0.7)		(1.2)	(0.7)		(2.2)	(1.4)

Active recognition

	R 6&9	F 2–3		R 12&15	F 4–5		R 18&21	F 6–7
R 6&9			R 12&15			R 18&21		
F 2–3	0		F 4–5	0.86		F 6–7	0.36	
1+Fs 2–3	3.24***	3.24***	1+Fs 4–5	2.78***	3.64***	1+Fs 6–7	3.92***	4.28**
	(1.5)	(1.7)		(1.3)	(1.8)		(2.3)	(2.5)

Passive recognition

	R 6&9	F 2–3		R 12&15	F 4–5		R 18&21	F 6–7
R 6&9			R 12&15			R 18&21		
F 2–3	1.72**		F 4–5	0.72		F 6–7	1.26*	
1+Fs 2–3	3.68***	1.96**	1+Fs 4–5	3.48**	2.76**	1+Fs 6–7	3.72***	2.46**
	(1.5)	(0.8))		(1.6)	(1.3)		(1.8)	(1.2)

Notes. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 5. The 'number of encounters' effects in the R task condition per degree of word knowledge. Mean differences, Post-hoc Tukey–Kramer mean comparison and effect sizes – Cohen d (in brackets) .

	Active recall			Passive recall	
	R 6&9	R 12&15		R 6&9	R 12&15
R 6&9			R 6&9		
R 12&15	0.04		R 12&15	0.32	
R 18&21	0.46*** (0.7)	0.42** (0.6)	R 18&21	0.9*** (1)	0.58** (0.6)
	Active recognition			Passive recognition	
	R 6&9	R 12&15		R 6&9	R 12&15
R 6&9			R 6&9		
R 12&15	1.08*** (0.7)		R 12&15	0.1	
R 18&21	1.34*** (0.9)	0.26	R 18&21	0.68	0.58

Notes. ** *p* < .01; *** *p* < .001.

Table 6. The 'number of encounters' effects in the F task condition per degree of word knowledge. Mean differences, Post-hoc Tukey–Kramer mean comparisons and effect sizes – Cohen d (in brackets) .

	Active recall			Passive recall	
	F 2–3	F 4–5		F 2–3	F 4–5
F 2–3			F 2–3		
F 4–5	0.1		F 4–5	0.14	
F 6–7	0.06	0.16	F 6–7	0.88*** (0.6)	0.74** (0.5)
	Active recognition			Passive recognition	
	F 2–3	F 4–5		F 2–3	F 4–5
F 2–3			F 2–3		
F 4–5	0.22		F 4–5	0.9* (0.5)	
F 6–7	0.98*** (0.6)	0.76** (0.5)	F 6–7	0.22	1.12** (0.6)

Notes. * *p* < .05; ** *p* < .01; *** *p* < .001.

1+Fs produced significantly better results (except an increase from 2–3 to 4–5 in passive recognition). The effect sizes in 1+F were the largest (see Table 7). Particularly notable are the effect sizes in the more difficult tests: the recall tests. Figures 5, 6, 7 and 8 show graphically the effect of the two variables, task type and number of encounters.

Research question 3 asked how the different combinations of 'number of encounters' and task type compare to each other in each degree of word knowledge. Post-hoc Tukey–Kramer tests with adjustment for multiple comparisons compared all 72 possible combinations of task type and 'number of encounters'. We will mention the most notable comparisons only. The *lowest* 'number of encounters' in the **1+Fs** condition (once in text + 1–2 times in exercises) was not significantly different from the *highest* number in **F** (6–7) and **R** (18&21) for active and passive recall, but it was significantly higher for
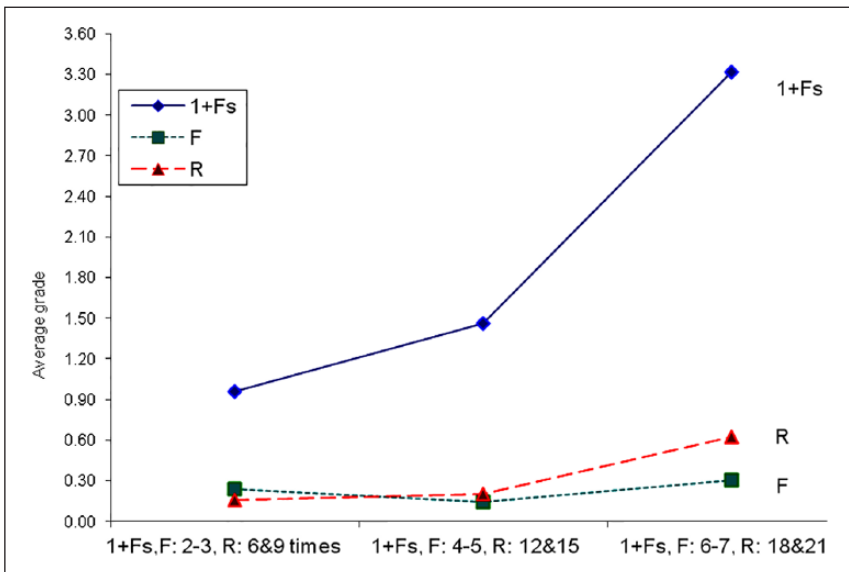
Table 7. The 'number of encounters' effects in the 1+Fs task condition per degree of word knowledge. Mean differences, Post-hoc Tukey–Kramer mean comparisons, and effect sizes – Cohen d (in brackets) .

	Active recall			Passive recall	
	1+Fs 2–3	1+Fs 4–5		1+Fs 2–3	1+Fs 4–5
1+Fs 2–3			1+Fs 2–3		
1+Fs 4–5	0.5** (0.3)		1+Fs 4–5	0.6*** (0.4)	
1+Fs 6–7	2.36*** (1.5)	1.86*** (1.2)	1+Fs 6–7	2.44*** (1.4)	1.84*** (1.1)
	Active recognition			Passive recognition	
	1+Fs 2–3	1+Fs 4–5		1+Fs 2–3	1+Fs 4–5
1+Fs 2–3			1+Fs 2–3		
1+Fs 4–5	0.62*** (0.3)		1+Fs 4–5	0.1	
1+Fs 6–7	2.02*** (1.2)	1.4*** (0.8)	1+Fs 6–7	0.72*** (0.4)	0.82*** (0.5)

Notes. ** $p < .01$; *** $p < .001$.

Figure 5. Active recall scores.

passive and active recognition (Tables 8 and 10). The *lowest* 'number of encounters' in **F** (2–3) yielded similar (not statistically different) results to the highest number (18&21) in **R** in all four degrees of word knowledge (Table 9).

Research question 4 asked which of the two factors (task type or 'number of encounters' with words) contributed more to learning. In Table 10, we provide examples of differences in the retention rates for different combinations of tasks and 'number of encounters'. For example 1+F 4–5 is compared with F 6–7, 1+F 2–3 is compared with R 18–21. What stands out is the absence of cases where a high number of encounters yields
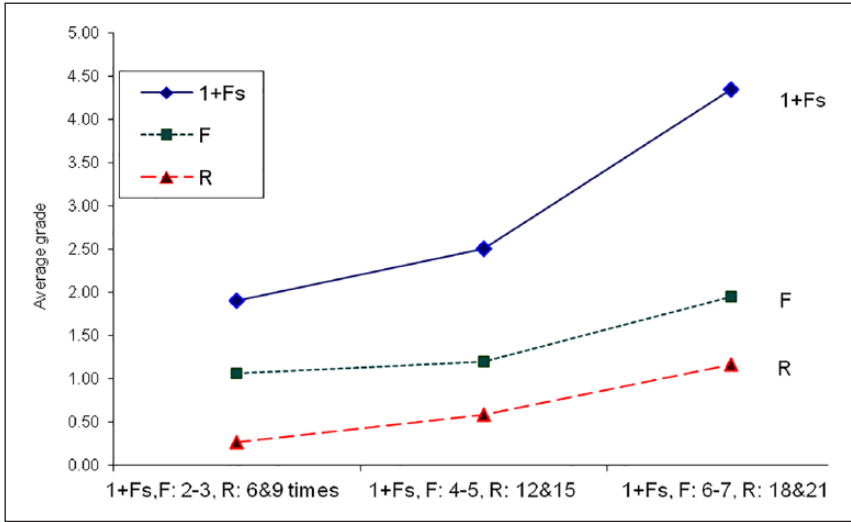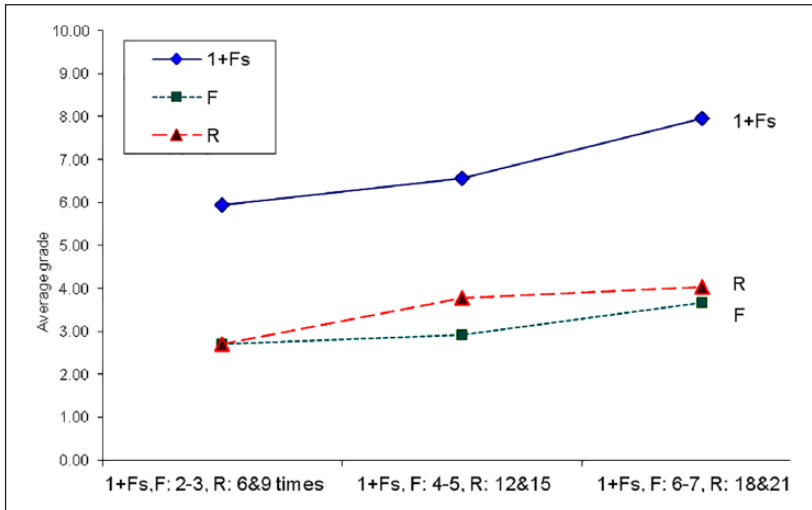
Figure 6. Passive recall scores.

Figure 7. Active recognition scores.

significantly better results in one task than a lower number in another task. A similar pattern was observed in most of the 72 multiple comparisons of pairs of task-encounter combinations. The differences in scores between these pairs in Table 10 are significant. Therefore, the answer to our research question 4 is that task type contributes more to learning than the number of encounters.
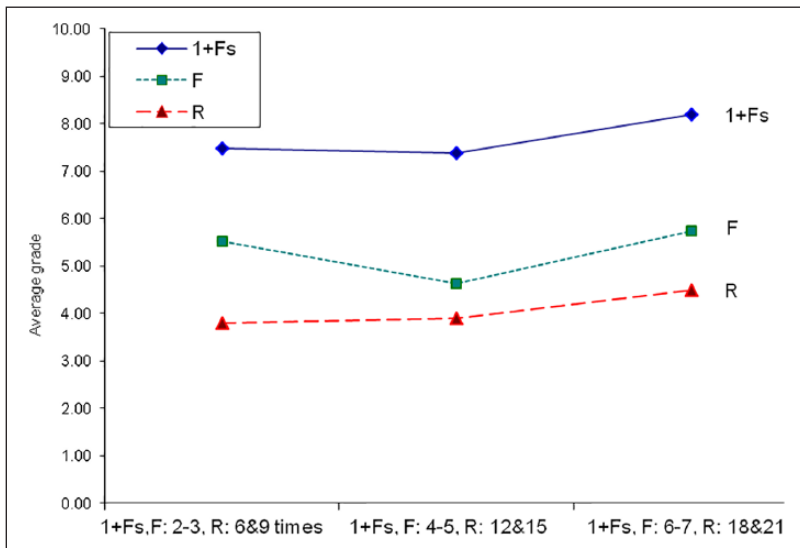
Figure 8. Passive recognition scores.

Table 8. Retention rates: Minimal exposure in 1+Fs compared with maximal exposure in R and F.

	R (Reading only); Maximal exposure; 18 and 21 times		F (Reading + Focus on Form); Maximal exposure (6–7)		1+Fs; 1–2 in exercises; Minimal exposure	
	Mean (Std)	Rate	Mean (Std)	Rate	Mean (Std)	Rate
Recall of form (active recall)	0.62 (0.66)	6%	0.30 (0.52)	3%	0.96 (1.10)	10%
Recall of meaning (passive recall)	1.16 (0.90)	12%	1.94 (1.66)	19%	1.90 (1.52)	19%
Recognition of form (active recognition)	4.04 (1.66)	40%	3.68 (1.76)	37%	5.94 (2.20)	59%
Recognition of meaning (passive recognition)	4.48 (2.42)	45%	5.74 (2.36)	57%	7.48 (1.94)	75%

Notes. R = Task condition: Reading + Focus on Form; F = Task condition: Reading + Focus on Form.

V   Discussion

This research examined how L2 word learning was affected by two factors and their different combinations: three task type conditions and three 'number of encounters' conditions. Altogether we studied nine main combinations (3 'task' × 3 'number of encounters' conditions). Participants were exposed to 30 target words, 10 in each of the nine

Table 9. Retention rates: Minimal exposure in F compared with maximal exposure in R.

	F (Reading + Focus on Form); Minimal exposure (2–3)		R (Reading only); Maximal exposure (18 and 21)	
	Mean (Std)	Rate	Mean (Std)	Rate
Recall of form (active recall)	0.24 (0.50)	2%	0.62 (0.66)	6%
Recall of meaning (passive recall)	1.06 (0.86)	11%	1.16 (0.90)	12%
Recognition of form (active recognition)	2.70 (1.60)	27%	4.04 (1.66)	40%
Recognition of meaning (passive recognition)	5.52 (2.28)	55%	4.48 (2.42)	45%

Notes. R = Task condition: Reading + Focus on Form; F = Task condition: Reading + Focus on Form.

Table 10. Differences in retention between different combinations of task and number of encounters.

Active recall	F 2–3	F 6–7	I+Fs 2–3	I+Fs 4–5	Passive recall	F 2–3	F 6–7	I+Fs 2–3	I+Fs 4–5
R 6&9			1.3***		R 6&9			1.64***	2.24***
R 12&15			1.26***		R 12&15		1.36*	1.32**	1.92***
R 18&21					R 18&21				1.34**
F 4–5					F 4–5				
F 6–7			1.16**		F 6–7				

Notes: **p < .01 ***p < .001   *Notes:* *p < .05 **p < .01***p < .001

Active recognition	F 2–3	F 6–7	I+Fs 2–3	I+Fs 4–5	Passive recognition	F 2–3	F 6–7	I+Fs 2–3	I+Fs 4–5
R 6&9		3.24***		3.86***	R 6&9	1.72 *		3.68***	3.58***
R 12&15		2.16***		2.78***	R 12&15	1.62*	1.84*	3.58***	3.48***
R 18&21		1.9***		2.52***	R 18&21			3***	2.9***
F 4–5		3.02***			F 4–5			2.86***	
F 6–7		2.26***		2.88***	F 6–7			1.74***	1.64**

Notes: ***p < .001   *Notes:* *p < .05 **p < .01***p < .001

Notes. R = Task condition: Reading + Focus on Form; F = Task condition: Reading + Focus on Form.

combinations, during 11 weeks. Two weeks after the treatment, the learners were tested on the target words by four unexpected tests for four degrees of knowledge: active recall, passive recall, active recognition and passive recognition.

This study showed a clear advantage of a task which included vocabulary exercises over reading activities (with or without Focus on Form), irrespective of the 'number of encounters' with the new words and irrespective of the degree of word knowledge. This advantage is more pronounced than in Laufer and Rozovski-Roitblat (2011). In the latter,

three vocabulary exercises produced a significant difference in the learning scores, while in the present study, one vocabulary exercise contributed to such a difference (see Table 4). One possible explanation of this stronger effect can be explained by specific translation exercises (see Appendix 1 online) that were included in our study, but not in the study above. Such an explanation is in line with Laufer and Girsai (2008), who showed that vocabulary practice based on the principles of translation and contrastive analysis yielded better results than other form-focused activities.

Of the two other tasks (reading only, and reading with a dictionary), the latter was more effective than the former. However, in view of rather discouraging results in both conditions, it appears that an authentic, communicative task, i.e. a reading activity which focuses on understanding the message of a text, even if it is enhanced by dictionary use, does not generate recall of word form or meaning. This conclusion echoes Waring and Takaki (2003) with regard to their 'reading only' task. Their data showed that even if learners meet the word more than 18 times, there is only a 10% to 15% chance that they will remember its meaning after three months.

As for the 'number of encounters' with new words, we found that it is the task that determines their effect. For example, minimal 'number of encounters' with the new words in word-focused activities (2–3) yielded better results than maximal number (18&21) in reading, for all four degrees of word knowledge, and better than maximal number (6–7) in reading with dictionary for three degrees of knowledge (see Table 8). A gradual increase in exposure to new words produces best gains in learning when words are practiced in word-focused activities. Therefore, we conclude that task effect is superior to the effect of number of encounters.

Theoretically, the effectiveness of form-focused instruction in general and word-focused activities in particular can be explained in terms of 'noticing', (Schmidt, 2001), elaboration (Baddeley, 1997), and 'involvement' (Laufer & Hulstijn, 2001). The 'noticing hypothesis' contends that a linguistic form in input becomes intake only if learners 'notice', i.e. pay attention to it. Therefore, drawing attention to new words might be a necessary condition for learning. Elaboration is associated with increased engagement with the meaning and form of the words, which, in turn, facilitates retention. Involvement is a motivational-cognitive construct that attempts to operationalize the concepts of 'attention' and its related notions into concrete and measurable L2 vocabulary learning tasks. Laufer and Hulstijn (2001) postulate that retention of words is conditional upon three factors in a vocabulary task: need, search and evaluation. Word-focused learning tasks often induce a combination of the above components, i.e. have a high involvement load.

From the instructional perspective, the study shows that what learners do with the word may be more important than how many times they come across it, since it is the nature of the task that determines how effective multiple encounters will be. But what would be an optimal combination of the two factors in language teaching?

Our answer to this question would depend on what we consider 'reasonable' word learning. There are no firm rules here, but since learning in our study was incidental (learners did not commit new words to memory for a test), we suggest considering a third, or 33% of word learning as 'reasonable'. Accordingly, in Table 11, we suggest some optimal combinations of task type and 'number of encounters' with new words for

Table 11. Reasonable rates of learning, task type and number of encounters.

Degree of word knowledge	Type of task	The lowest number of encounters	Rate of learning
Active recall	1+Fs	6–7	33%
Passive recall	1+Fs	6–7	43%
Active recognition	1+Fs	2–3	59%
	F	6–7	37%
	R	12 and 15	38%
Passive recognition	1+Fs	2–3	75%
	F	2–3	55%
	R	6 and 9	38%

Notes. R = Task condition: Reading + Focus on Form; F = Task condition: Reading + Focus on Form.

each degree of word knowledge. The table shows that the more demanding the type of knowledge is, the more exposures are needed in the same task type. Thus, while 6–7 exposures in 1+Fs (Reading with one exposure and subsequent Focus on Forms) led to 33 % of acquisition in the active recall (the most difficult type of knowledge to achieve), 2–3 exposures in the same task led to 75% acquisition in passive recognition, which is the weakest type of knowledge and the easiest to attain. The table also shows that in the case of the same number of exposures, the more word focused the task is, the higher degree of knowledge it yields. Thus, six and nine exposures in R (Reading only) led to 38% acquisition on passive recognition, 6–7 exposures in F (Reading with Focus on Form) led to 37% acquisition on active recognition, 6–7 exposures in 1+Fs led to 43% acquisition on passive recall. If these learning rates are viewed as insufficient, one way to increase them could be the addition of subsequent intentional learning.

VI Concluding remarks

The complex design of the study may have led to some weaknesses. These involve the equating of the difficulty of the words across the different treatments, and the possible facilitation effects between the tests that test the same words. However, we made clear attempts to deal with these areas of weakness. The words in each treatment are a mixture of parts of speech, and the words are of roughly equal length. The four tests were not given immediately one after the other. Two were given on one day and two on the next, and those given on the same day were not given together, but were spaced with one being given at the beginning of the lesson and the other at the end. Further research could try to investigate how the same words are learnt after a certain number of encounters and how the knowledge increases following additional encounters. If groups of equivalent L2 proficiency participate in the study, possibly one or two tests could be given to each learner rather than four as in our study.

The teaching implications of this study are clear. If one or two good exercises with new words lead to better learning than 18–21 encounters with the words in texts, then such exercises should be an integral part of course and material design. Clearly a well-balanced course needs to include opportunities for vocabulary learning through

extensive reading. However, this study shows that such a course also needs to include word focused vocabulary learning, because the effects of such learning are so strong.

Declaration of conflicting interest

Funding

Notes

1. Cobb (2007) analysed a sample extracted from the 1 million word Brown corpus. The Brown Corpus of Standard American English was the first of the modern, computer readable, general corpora. It was compiled by Kucera and Francis (1967).
2. Pre-tests, treatments and post-tests were designed separately for native speakers of Hebrew, Arabic and Russian using their L1. We believe that the different L1s of the learners, or being Hebrew–Arabic and Hebrew–Russian bilinguals, did not exert a difference on the learning results as none of these languages is Germanic or Romance, and the target words did not contain any cognates with the three languages.

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