Differential Allocation of Attention to Meaning and Form in Reading Comprehension for Monolingual and Bilingual Learners of English

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Abstract

In the light of evidence that attention can facilitate and enhance learning, this study attempts to investigate the allocation of attention to meaning and form simultaneously in reading comprehension in the foreign language among monolingual and bilingual learners of English. To this end, three groups of learners namely, bilingual (knowing Kurdish, Persian), monolingual (knowing Persian) learners of English and mixed (equal number of bilingual and monolingual learners) as the control group were selected based on the results of a language proficiency test ((MTELP). The learners in the two experimental groups were asked to read a written text for meaning and circle a designated lexical form. The learners in the control group were only required to read the text for meaning and answer the follow-up questions. To examine whether the type of attentional condition and bilinguality, as the two independent variables of the study, have any significant effect on comprehension scores, a two-way ANOVA was run. Think aloud technique was also employed to elicit the learners' targeted thought processes from the groups which had to circle the targeted lexical form. The results indicated that the experimental group who paid simultaneous attention to form and meaning and processed the targeted item for both form and meaning gained better comprehension scores regardless of the number of languages they knew. Moreover, it was shown that deeper levels of processing are associated with better comprehension ability. Therefore, we may conclude focus on the lexical form might improve comprehension as indicated by comprehension scores and may be an effective way to make texts more comprehensible. **Key Words**: Attention, monolinguals, bilinguals, meaning, form, reading comprehension

Introduction

Majority of the studies that have been directed at uncovering language learning processes operate under the assumption that language learners are monolinguals learning a second language (Kramsch, 2012), yet with the advent of globalization and the expansion of mobility and communication technology, a considerable number of language learners tend to be bilingual or even multilingual. Therefore, examining and exploring how learning a third language is different from learning a second and what processes are involved in merit further investigations. This endeavor should be undertaken to shed some light on how third language learners learn and may have implications as to how they can be helped in their journey to become trilingual.

It is a rather established fact that prior knowledge influences our understanding and interpretation of a text in a new language (Ellis, 2006). In this regard, Ellis proposes the concept of "learned attention" to capture the idea of L1 affecting L2 processing and adopts McWhinny's (1987) competition model to illustrate this point. He explains how second language learners selectively attend to some parts of a sentence and ignore the redundant non-salient features. In an argument similar to VanPatten's (2004) primacy of meaning principle, he posits that language learners attend to content words rather than forms of low cue validity. He states that content words overshadow non-salient linguistic features. What could be of interest for further research is that maybe learners with different L1 backgrounds attend to different parts of a sentence. Moreover, it is still not clear how being a third language learner and knowing more than one language would influence processing at different levels of comprehension.

Any theory of sentence comprehension should account for "(i) the representations, which are encodings in memory, (ii) what information is extracted from incoming words, and (iii) how that information is used to combine the incoming" (Malko, Ehrenhofer, & Phillips, 2016, p.1). The majority of current research indicates the mixed storage and high interconnectivity of language

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systems in the mind of a multilingual (Szubko-Sitarek, 2015). Learners, therefore, are highly likely to make use of all the linguistic resources available to them to make sense of a particular sentence. However, it is still unclear whether they use L1 or L2 or both to process the meaning of a sentence in a third language. In other words, what linguistic resources do they exploit to comprehend the meaning of a sentence in another language? Do they reconstruct meaning in L1, L2, or both?

So far most of the studies on input processing have been done in second language acquisition and it is not clear whether knowing a third language would be an asset in attending to meaning and form simultaneously. Furthermore, as some studies have demonstrated low proficiency language learners often resort to their L1 and their knowledge of the world to interpret and understand the meaning of sentences and texts, thus, it is likely that multilingual learners use both L1 and L2 and maybe even outperform second language learners due to knowing two languages. No previous studies, to our knowledge, have been undertaken to compare the performance of low proficiency third language learners in allocating attention to meaning.

Attention has long been associated with processing and subsequent learning (Schmitd, 1990). The role of attention is central in theoretical and applied linguistics. In theory, most, if not all, theatrical approaches to language learning posit a role for attention whether they regard it as the detection or noticing (Schmidt, 2001; Tomlin & Villa, 1994).

Recently, Robinson (2017) while emphasizing the interrelation between attention and awareness distinguished different levels of these two concepts. Two levels of attention, namely perceptual attention (attending to different issues automatically and unconsciously) and focal attention (attending to issues consciously) come into the fore in language learning issues. When learning occurs without attention, it simply means that there is no focal attention to input, just choosing some parts of data for more processing in memory. To justify such kind of learning, Robinson maintains that at the perceptual processing stage, rudimentary detection of input before selection takes place which assists the learner to learn. As such he concludes that this learning usually occurs without awareness as awareness is a prerequisite to focal attention. Similarly, awareness has also different levels ranging from noticing surface structures to understanding rules and regularities.

Review of the Related Literature

It is claimed that attention facilitates and enhances learning (Baars & Gage, 2010; Logan, 2005) since it induces learners' attention to intended linguistic forms and leads to noticing. Robinson (1995) defined noticing as "detection plus rehearsal in short-term memory, prior to encoding in long-term memory" (p. 296). He claimed that only detected input is focally attended to and noticed. While detected input goes into short-term memory, focally attended input goes into working memory. Schmidt (2001) emphasized the importance of attention in all types of learning both conscious and unconscious and believed that little learning can occur without attention. Tomlin and Villa (1994), Truscott (1998) and Carroll (2006) believed that attention and input and not necessarily awareness contribute to learning.

Attention in the field of SLA has received substantial research interest and many applied linguists have paid much heed to it. Schmidt (2001) attributed a pivotal role to attention in every aspect of the SLA process. He believed that attention helps us to understand L2 development, variation, fluency, individual differences and the role of instruction. Learners may attend to form or meaning or both when processing input (Greenslade, Bouden, & Sanz, 1999; VanPatten, 1990; Leow, Hsieh & Moreno, 2008). However, Norris and Ortega (2000) believe that attention to form and meaning simultaneously is more efficacious than either alone. VanPatten (2004) in his "primacy of meaning principle" postulated that "learners process input for meaning before they process it for form" (p.14). VanPattan (1990) investigated learners' attention to meaning and form simultaneously in aural input. He used control and experimental groups to assess the learners' attentional resources. Low proficiency learners in the experimental group were required to listen to the passage and identify the occurrences of the three target L2 forms, namely inflació n, la and – n. The results indicated that low proficiency learners cannot process both form and meaning in aural L2 mode. Attention to grammatical items negatively influenced learners' comprehension compared to the control group but attending to lexical items did not. Greenslade et al. (1999) replicated VanPattn's study in the written mode. In this study, the learners were required to circle the same target forms in the passage. He obtained similar results as VanPattn's. Learners who attended to a lexical form understood the passage as well as control group but comprehension was somehow blocked when they attended to grammatical form. Wong (2001) surveyed simultaneous attention to form and

meaning in both aural and written modes. This was another replication of VanPattn's study. Wong used the English translation of the Spanish text that VanPattn used. He found that in the aural mode, results corroborated VanPattn's study whereas in the written mode the same level of comprehension was achieved by all groups. Wong propounded that learners' attentional resources may be varied in the written and oral modes. Leow et al. (2008) followed the same line of inquiry but with some modifications in the methods used like the use of think-alouds to elicit learners' targeted thought processes, the use of multiple choice questions to check learners' comprehension of the text, and the use of new grammatical forms. In the written mode, no differences were found between the experimental and control groups. They believed that differing cognitive constraints for processing different modalities account for varied sets of results. They also found that target forms may be processed at different levels by different learners. Morgan-Short, Heil, Botero-Moriarty, and Ebert (2012) studied simultaneous attention to form and meaning and the reactivity of think-aloud protocols in the written mode. Their results showed that learners' attention to lexical or grammatical forms did not influence the comprehension of the reading passage. They also found that thinking aloud had a reactive effect when reading a passage for meaning and concurrently paying attention to form. Finally, it was found that learners with deep processing of forms experienced greater understanding.

Tomlin and Villa (1994) discussed three subparts of attention, namely alertness, orientation, and detection. Alertness is concerned with interest and motivation. Orientation is associated with input-flooding and attention to form. They refer to detection as "cognitive registration of stimuli" which is crucial for learning and processing. LaBerge (1995) stated that attention has the potential to facilitate or increase processing. Accordingly, selected materials require more attention (Neill, Valdes & Terry, 1995) and ignored information receive little attention (Van der Heijden, 1981). It has also been found that language components require different attentional resources. In other words, the way that learners allocate attention and awareness to learning vocabulary and morphology is different from learning syntax (VanPatten, 1994; Schwartz, 1993). Meanwhile, attention should be subject to a particular learning domain, that is, it should be concentrated and it must not just be global (Schmidt, 2001). Put it differently, to learn phonology, attention must be focused on the L2 sounds and to learn vocabulary, the learner should attend both to word forms and contextual clues.

Similarly, Robinson, Mackey, Gass, and Schmidt (2012) maintained that when processing grammatical gender, learners pay more attention to morphophonological cues (noun endings) rather than syntactic cues. Lew-Williams (2009) found that learners pay less attention to syntactic cues for gender like agreement on adjectives and determiners. Mackey, Gass, and McDonough (2000) elicited learners' perceptions of oral feedback using retrospective interviews in order to survey learners' attention to different parts of the language. They focused on learners' production of the target language and examined their attention on specific aspects of language especially deviated forms. The role of attention was also investigated by Gass, Svetics, and Lemelin (2003) on the learning of three aspects of language, namely lexicon, syntax, and morphosyntax. By manipulating attention, they found that syntax received the largest amount of attention while without focused attention, lexicon drew the learners' attention. They also highlighted the role of proficiency in lowering the effect of directed attention.

In the same fashion, Armengol and Cots (2009), firstly investigated the nature and objects of attention in two university students and secondly, they surveyed the relationship between the attention processes and the final written products. These students were multilingual and underwent think-aloud protocols while engaging in writing an essay in two languages (Spanish and English) other than their first language (Catalan). The researchers found that the participants of the study made use of their multilingual resources in creating a text in a specific language. With regard to attention episodes as indicated in think-aloud protocols, it was found that the subjects focused on procedure-related and language-related issues separately. The objects of attention in procedure-related awareness episodes were content, text structure and cohesion, rhetoric, and writer's block while in language-related awareness episodes were grammar, spelling, sentence cohesion and structure and word choice. With regard to the relation between the attention processes and the final written products, the researchers observed that explicit and implicit nature of awareness episodes may be of importance and needs attention, as one participant exhibited good implicit knowledge whereas the other showed good explicit knowledge about writing.

Godfroid and Uggen (2013) investigated German beginning second language learners' attention to irregular verb morphology during sentence processing by means of eye-tracking techniques. He found that learners paid more attention to stem-changing verbs than those verbs

which were regular, demonstrating the delayed effect of irregularity of verbs on reading times. Godfroid, Boers, and Housen (2013) wanted to know whether more attention contributes to more learning. Specifically, they aimed to address whether L2 learners devote more attention to unknown words when reading for pleasure. In other words, they assessed the role of attention in incidental vocabulary learning in the second language using the eye-tracking technique. The results revealed that the subjects of the study allocated more time for processing the unknown words than familiar words. The results of their study were in line with Ellis' (2002) and Rayner's (2009) findings in which low-frequency words required more processing time than high-frequency words.

Finally, Dolgunsöz (2015) measured learners' attention while reading L2 text and learning gains by means of eye-tracking technique. The results indicated that learners spent less time on familiar words than unfamiliar words. A positive correlation was also found between attention and learning gains. He also discussed merits and drawbacks of eye tracking methodology compared to other techniques of measuring attention like note-taking, underlining and verbal protocols. Eye tracking is the robust method of gathering attentional data without suffering from reactivity and memory decay. However, there are some technical challenges facing researchers regarding the use of this technique which makes it demanding for them.

Although there have been few investigations regarding how learners allocate attention to meaning, the paucity of studies concerning whether multilingual learners differ in allocating attention to meaning and form from bilingual learners was a significant incentive in conducting this study. Accordingly, this study intends to investigate whether multilingual learners utilize linguistic resources of first, second or third language when attending to meaning. In other words, whether knowing a third language (being multilingual) will be an asset in attending to specific aspects of meaning compared to bilingual or monolingual learners. This research specifically aims to focus on the following research questions:

1. Does simultaneous attention to form and meaning of lexical items in the written text have a significant effect on comprehension?
2. Does the allocation of attention to meaning affect comprehension differently for bilinguals and monolinguals?
3. Is there a statistically significant effect on reading comprehension due to the interaction effect of bilinguality and attentional condition?
4. Do different levels of processing lexical items make a difference in comprehension?

Methodology

Participants

The study utilized a convenient sampling method and the participants were recruited from among the low intermediate level students based on their English proficiency score at university entrance exam majoring in Mechanical engineering at Kashan University, Iran. The subjects were male and female, 26 monolingual and 28 bilingual. The learners' first language was Farsi or Kurdish. The Kurdish language is usually spoken in Northwestern Iran (Kurdistan province). To achieve the purpose of the study, three intact classes of third-semester English course with students' and instructors' consent were selected. To ensure the exact proficiency of the students in English, a language proficiency test was administered among the participating students. To save time, a reduced form of Michigan Test of English Language Proficiency (MTELP) was applied. Those with one standard deviation above or below the mean based on the result of MTELP were selected. Then, the subjects were divided into two groups based on whether they were monolingual or bilingual. An equal number of subjects (10) from each group was selected to be assigned to the third group, that is, control group. The first group constituted bilingual learners of English (25 participants). These learners speak Kurdish as their first language, Farsi as their second language at school and community and English as their third language. The second group consisted of monolingual learners whose first language was Persian and they learn English as a foreign language (25). The final number of participants for the monolinguals was 18 and for the bilingual group was

16. The third group which consisted of the equal number of monolingual and bilingual learners (10 bilinguals and 10 monolinguals) acted as a baseline to compare the performance of students in the first and second groups (20).

Instrumentation

The materials for this study were adopted from Wong (2001). Wong herself adopted the text from

VanPatten (1990) which was originally written in Spanish for listening and reading comprehension. This study utilized multiple choice questions to check the learners' comprehension of the text as they were used in Leow et al. (2008) and Morgan-short et al. (2012). Meanwhile, one content word was chosen for the students to attend to in the reading comprehension task. That lexical item was the word "*inflation*" as it was used in VanPattan (1990) and Wong (2001). The verbal protocol was also used to elicit learners' targeted thought processes at the end of the test. The type of technique applied in this study was think- aloud protocol.

Procedure

As this study attempted to probe simultaneous attention to meaning and form among monolingual and bilingual learners of English, three groups of monolingual, bilingual and mixed as control group were selected. Learners first received instructions regarding how to perform their tasks. In the control group, the learners were asked to read the text for meaning and answer the follow-up questions. Students in monolingual and bilingual groups were told to read the passage for meaning too and circle the word "inflation" whenever they encountered in the text and then answer the comprehension questions. Reading comprehension questions were designed in Persian since it was believed that the goal is to check the overall comprehension of the text and not the questions. The subjects were asked to complete their tasks in ten minutes. Then, the participants of the study (except the control group) were asked to verbalize what was going through their mind when performing the tasks. As the control group was not required to pay attention to form while reading for meaning, they were not asked to verbalize their thought. For further analyses, the learners' reports were audio-taped by researchers or recorded by the participants themselves using their cell phones. Students' recordings then were emailed to the researchers and transcribed and coded along with researchers' audio-taped files. The obtained results of each group were analyzed so as to shed light on the attentional resources they employed in comprehending the meaning of the sentences. To be included in analyses, the subjects were required to detect the minimum of at least 60% of the target item, as it was also highlighted in previous studies. Subjects received one point for every correct answer to multiple choice questions and zero points otherwise. To operationalize attention, the lexical items circled or mentioned in think-alouds were coded as instances of attention. Think-aloud protocols were coded by the researchers. If learners asserted that they went back to read the text in order to answer the questions, the researchers eliminated them from the subjects' pool.

Results

To address the first and the second research questions investigating whether the type of attentional condition and bilinguality, as the two independent variables of the study, have any significant effect on comprehension scores, a two-way ANOVA was run with two between-subject factors (number of known languages and attentional condition). Before running the ANOVA, descriptive statistics were calculated for the groups. Table 1 presents the mean scores and standard deviations for all groups.

Table 1
No. of known languages and attentional condition

Group	Mean	SD	no.
Monolingual	3.16	1.24	18
Bilingual	3.06	1.34	16
Mon.(control)	2.3	1.25	10
Bi. (control)	2.4	1.17	10
Total	2.83	1.28	54

As shown in table 1, there does not seem to exist a large difference between the monolinguals and bilinguals in their comprehension of the foreign text. Table 2 presents the descriptive statistics for the effects of the two independent variables, which are bilinguality and attentional condition. It shows that monolingual and bilingual speakers who focused on the content words had better mean scores than those who did not.

Table 2
Descriptive Statistics for the effects of the two independent variables

Lang. status	Attention	Mean	SD	no.
Monolingual	Circle	3.16	1.24	18
	Not circle	2.3	1.25	10
	Total	2.85	1.29	28
Bilingual	Circle	3.06	1.34	16
	Not circle	2.4	1.17	10
	Total	2.8	1.29	26
Total	Circle	3.11	1.27	34
	Not circle	2.35	1.18	20
	Total	2.83	1.28	54

The results from ANOVA, as presented in Table 3, showed that there was no statistically significant interaction between the effects of bilinguality and attentional condition, F (1, 50) = .082, p = .77. In other words, simple main effects analysis showed that there was no significant difference between monolinguals and bilinguals in terms of comprehension, F(1, 50) = 0.00, p = .99. There was, however, a significant difference in comprehension scores between the group which circled the lexical item and the group which did not, F (1, 50) = 4.59, p = .03. Overall, the results showed that bilinguality or monolinguality do not seem to have a particular role in learners' ability to attend to the meaning and to comprehend a text. In other words, it was only the focus on the lexical target that determined the learners' comprehension scores.

Table 3
Tests of between-subjects effects to examine the effects of attention and bilinguality

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7.563a	3	2.521	1.577	.207	.086
Intercept	375.553	1	375.553	234.904	.000	.825
attention	7.352	1	7.352	4.599	.037	.084
No. of known langs.	5.459E-5	1	5.459E-5	.000	.995	.000
attention*No. of known langs.	.131	1	.131	.082	.776	.002
Error	79.938	50	1.599			
Total	521.000	54				
Corrected Total	87.500	53				

a. R Squared = .086 (Adjusted R Squared = .032)

It was assumed that learners' overall comprehension was likely to deteriorate when they had to put in additional cognitive resources and efforts to process meaning and form simultaneously and that the average comprehensions score for those who had to circle the lexical item and process it more deeply would be lower than those who only processed the text for meaning. However, the findings of the study, as shown in Table 3, did not support these assumptions. In fact, the results proved quite the opposite. As shown in Table 3, those who paid simultaneous attention to form and meaning and processed the targeted item for both form and meaning gained better comprehension scores regardless of the number of languages they knew. Overall, the findings from the present study do not support the claim that deeper processing of lexical items hinders processing for meaning and overall comprehension of the text.

Results of Coding: Operationalization of Attention to Meaning and Form

To answer the second question of the study, think-aloud protocols were gathered for the groups which had to circle the target form. They were coded to make sure that the participants were following the instructions and had paid attention to the targeted form while their attention was simultaneously focused on meaning. Attention to meaning was, therefore, operationalized as the participants' sustained effort to comprehend the meaning of the text while simultaneously mentioning and/or circling the form. The participants who did not report the targeted form by a

minimum of 60% were excluded from the study. The think-aloud protocols revealed that for the groups, whether bilingual or monolingual, there were some participants who did not process the input for meaning. Others looked back at the text to answer the comprehension questions (backtracking). As mentioned earlier, they were eliminated. Adding these participants to the data pool would have jeopardized the validity of the study as processing for meaning was the basic requirement of the study and could have a detrimental effect on the results of the study. Half of the think-aloud protocols were coded by two raters. The interrater reliability was calculated and found to be 85%.

Depth or Levels of Processing

There were also differences in the learners' level of attention and the processing of the target lexical form. The participants' level of processing ranged from mere attention to form, pronouncing the word, raising the intonation while reading the word, to translating or interpreting. To explore these levels, concurrent data were analyzed by two coders to categorize the levels of processing (inter-coder reliability was 90%). The think-aloud data revealed three levels: The first level was associated with the simple circling of the target form. The second level was providing a report of processing for example by reading with a noticeable intonation, and the third level was translating the target form (see Table 4 for analysis).

Table 4
Descriptive statistics of different levels of processing

processing	*Mean*	*SD.*	*no.*
First level	2.5	1.30	8
Second level	2.44	.88	9
Third level	3.76	1.14	17
Total	3.11	1.27	34

Table 5
Tests of between-subjects effects for different levels of processing

Source	Type III Sum of Squares	*Df*	Mean Square	*F*	*Sig.*
Corrected Model	14.248[a]	2	7.124	5.622	.008
Intercept	257.173	1	257.173	202.957	.000
process	14.248	2	7.124	5.622	.008
Error	39.281	31	1.267		
Total	384.000	34			
Corrected Total	53.529	33			

a. R Squared = .266 (Adjusted R Squared = .219)

As it was already mentioned, there were different levels of processing; some of the participants reported the target form in addition to circling it. They made some comments about it or changed their intonation or reading it louder or paused after it. All of these cases were considered as indications of a deeper level of processing compared to when participants were only circling the word and therefore this could suggest allocating more attentional resources to it (Craik, 2002). As attention to form was the only predictor of learners' ability to comprehend the text, a comparison was made between the learners with different levels of attention to the text to examine the effects of different levels of processing on the learners' comprehension of the presented text.

As shown in Table 6, the difference between the participants processed the text at a deeper level (the third level) had significantly higher comprehension scores than the other two groups. The difference between the first level and the second level participants did not even approach significance. However, it is not surprising that most of the participants embarked on interpreting and translating the word, given its salience in the text. However, at the start of reading, they just noticed the word and then gradually they realized that the whole text depended on that word. They tried to make sense of the word by guessing or interpreting the word from the context. As shown in the table, most of the learners showed signs of deeper levels of processing. This may not be surprising, as the circled item is a lexical item and is, therefore, more salient and also crucial to comprehending

the text. What is clear, nevertheless, is that deeper levels of processing, as it was mentioned, are associated with better comprehension ability.

Table 6 *Multiple Comparisons of different levels of processing*

		Mean Difference			95% Confidence Interval	
(I) process	(J) process	(I-J)	Std. Error	*Sig.*	Lower Bound	Upper Bound
First	Second	.0556	.54698	.994	-1.2907	1.4018
	Third	-1.2647*	.48263	.035	-2.4525	-.0769
Second	First	-.0556	.54698	.994	-1.4018	1.2907
	Third	-1.3203*	.46404	.021	-2.4623	-.1782
Third	First	1.2647*	.48263	.035	.0769	2.4525
	Second	1.3203*	.46404	.021	.1782	2.4623

Based on observed means.

The error term is Mean Square(Error) = 1.267.

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

Leow et al. (2008) pointed out that the degree of engagement with form depends on the saliency of the target forms. Participants tend to notice and process content words more effectively than function words (Ellis, 2006). Therefore, attention to form, in this case, does not appear to reduce attention to meaning and, hence, does not seem to affect comprehension detrimentally. All in all, this result indicates that there seems to exist a clear relationship between the level of processing and the comprehension scores. The results of the study, therefore, corroborate the finding of previous studies that simultaneous attention to form and meaning does occur but at different levels.

Discussion

The current study has investigated the effects of bilinguality and type of attentional condition on simultaneous attention to form and meaning. With regard to the effects of knowing an additional language on attention to form and meaning, no significant difference was observed between monolingual and bilinguals. To the best of researchers' knowledge, no previous studies have addressed this issue, therefore drawing comparisons to other studies is not possible. Further research, especially of neurological type, is recommended to uncover the complexities of bilingual and multilingual subjects. With regard to the effect of type of attentional condition, it was found that it did not affect comprehension negatively. This finding is in line with the results from Morgan-short et al. (2012), Leow et al. (2008), and Wong (2001) but different from the findings from the studies on written comprehension such as Greenslade et al. (1999) and from the studies on aural comprehension by VanPatten (1990) and Wong (2001). This difference was not observed in Greenslade et al.'s study. Our study also confirms VanPatten (1990)'s finding in that focusing on lexical items may lead to better overall comprehension of the text whereas a more non-salient redundant feature may hinder comprehension. A possible explanation for this result might be methodological issues. In Greenslade et al.'s (1999) and VanPatten's (1990) studies, the participants were asked to mark all the targeted forms during exposure and nearly 67% of the *–n* forms were in one paragraph. Thus, it was not clear whether participants were processing the form and meaning simultaneously. In our study, we made sure that there is an equal distribution of the target form across the passage. Also, some of the participants in VanPatten's study admitted that they were not following the instructions for paying simultaneous attention to form and meaning which make the data collected from those participants questionable. In the present study, however, special care was taken to make sure that the participants were following the instructions as precisely as possible.

As suggested in previous studies (e.g. Leow et al., 2008; Wong, 2001), modality can be a possible explanation for successful simultaneous attention to form and meaning. Four studies administered via a written text, including Morgan-Short et al., Leow et al., Wong and the current study report that comprehension is not negatively affected by the attentional condition. The two studies administered in aural mode, i.e., VanPatten (1990) and Wong (2001), on the other hand, have reported negative effects of attention to form on comprehension.

Another possible explanation for the differences between the studies conducted in written mode could be the learners' proficiency level. In the present study, the participants' proficiency level

was controlled by administering a proficiency test at the beginning of the study. The learners in Wong's study recalled 12 idea units out of 52 whereas the learners in Greenslade et al. (1999) recalled 22.5 idea units out of 53. This clearly indicates that the participants in Greenslade et al. 's (1999) study were more proficient. For the studies to be comparable, similar levels of proficiency should be ensured to rule out the effect of mediating variables.

Since the current study and Leow et al. (2008) used different measures of comprehension from those of Greenslade et al. and Wong, it would be difficult to compare them. If these studies employed the same measure of comprehension, then their comparison would have been more plausible and would enable a more valid comparison. Although the proficiency level of the participants could possibly interfere with the results in such research studies, it does not challenge the conclusion that modality is an important variable. It seems that in the written mode, attention to form while reading for meaning does not have a negative effect on comprehension. However, this does not appear to be true about the aural mode.

Another issue worth considering is why studies conducted through different modes of presentation produced differing results with regard to simultaneous attention to form and meaning. Some suggest that cognitive constraints may account for the existing differences as attentional capacity may be controlled differently by cognitive factors in written and oral modes (Wong, 2001). In other words, due to the simultaneous nature of the oral mode, learners' cognitive capacities might have a more determining role in their ability to comprehend. In the written mode, however, this might not be quite a factor as the text is not transient in nature. Accordingly, a possible explanation could be that aural mode is constrained by the limitations of the processor, whereas in written mode, processing is not constrained in the same way. However, it should be noted that in the studies in aural mode timing was controlled, but in the written mode the participants were asked to circle the items at their own pace. Recently, research in cognitive psychology implies that attentional constraints and processes are basically the same in different modalities (Chun, Golomb & Turk-Browne, 2011). However, in the written mode, attentional constraints become more evident when the timing is controlled through the rapid visual presentation of input.

To further explore the issue of attention during the process of comprehension, this study also examined the role of depth of processing. To determine this and finding the relationship between the level of processing and the overall comprehension the verbal protocols were analyzed. Leow et al. (2008) had argued that the framework of level of processing proposed by Craik and Lockhart (1972) may explain the results of the studies which reported the lack of effects of attentional condition on comprehension.

In Leow et al.'s (2008) study since most of the targeted items were forms, few participants had attended to the targeted forms at a deep level of processing. They stated that this shallow processing of form used limited attentional resources and most of the attention was given to processing meaning. They suggested that "the non-significant difference in comprehension between experimental conditions might be attributed to the relatively low level of processing reported in all experimental groups in regard to the targeted form" (p. 686). The only conclusion they could arrive at giving their limited number of participants was that attention to form did not have negative effects on comprehension. Interestingly, the findings of the current study corroborate this statement as it was shown that deeper levels of comprehension lead to increased comprehension scores.

In the current study, similar to the work done by MorganShort et al. (2012), there was sufficient data to run statistical analysis that showed that a deeper level of processing is associated with a better comprehension score. This conclusion, however, does not seem to be in congruence with VanPatten's primacy of meaning principle. Nevertheless, these results do seem to be consistent with the predictions made by Craik's (2002) levels of processing framework, which claims that retention of items in memory depends on the level of processing of the item when encoding. The framework postulates that recalling items which have been processed deeply is more likely than those who have undergone shallow processing. The findings of this study confirm the predictions of this framework. When the lexical form is processed deeply, attention to it does not interfere with processing for meaning which leads to better comprehension.

Moreover, the type of linguistic target might have played an important role in the findings too. As the results of the tables display, most of the students processed the targeted form at a deep level. *Inflation*, being a lexical item, carried more semantic weight and therefore was noticed more easily and processed more deeply compared to grammatical items which carry less meaning and sometimes seem to be semantically redundant (Morgan-Short et al., 2012). The same holds true in Leow's and Morgan-Short's studies as participants in these studies processed *Sol* which is a lexical

item more deeply than the morpheme *–n* which carries less meaning. The low level of processing of grammatical forms in these two studies did not appear to impose any cognitive load when processing the text for meaning and therefore no effect is seen on comprehension contrary to the results of the Greenslade et al. (1999) and VanPatten (1990).

Conclusion

The current study attempted to expand the findings of previous studies with an advantage in which the proficiency level of learners was controlled for. The primary goal was to see if there were any differences between monolingual (Persian as the first language) and bilingual (Kurdish as a first and Persian as second language) learners of English. The results confirmed the findings of Leow et al. (2008) to a large extent. No significant difference was observed between bilingual and monolingual learners regarding the level of processing of the targeted lexical form as far as the subject of attention to meaning and form is concerned. However, in the current study, the results of the analysis of data yielded interesting findings with regard to the level of processing. It indicates that learners should be encouraged to focus more on the content words and process them more deeply since deeper processing is associated with better reading comprehension according to the findings of the present study. Furthermore, the results showed that, as with Leow et al. (2008) and Wong (2001), paying attention to lexical forms when trying to understand meaning did not have any negative effect on comprehension, as VanPatten's primacy of meaning principle would predict. In fact, the results showed that focus on the lexical form does have a positive effect on comprehension. This means that using input enhancement techniques such as textual input enhancement could positively affect comprehension especially if the content words are targeted. The analysis of verbal protocols further revealed that the more deeply the lexical item is processed the greater the comprehension score would be. Further research probably should consider the effect of modality, the timing of input, level of processing and L2 proficiency so that we may arrive at a clearer understanding of the issue.

Like any other study, however, this research project suffers from a number of shortcomings. The most prominent ones are as follow: First of all, the number of participants was somehow low. This will jeopardize the generalizability of findings beyond the current research. The mortality of some participants due to backtracking was also disappointing. Second, this study focused on the allocation of attention to lexical meaning and ignored the grammatical form. Future studies can investigate the allocation of attention to grammatical form and meaning among multilingual learners. Third, eye-tracking technique, a new research method, could also be employed to investigate the issue of attention as it was applied in some researches (see Godfroid & Uggen, 2013; Godfroid et al., 2013). The use of eye-tracking is also a better technique to control for the potential effect of reactivity. Fourth, this study specifically focused on written input and ignored aural input. Future studies could be conducted with aural input or both written and aural input being presented within the same time period to control for the effects of timing. Finally, although our results were discussed with reference to levels of processing, it has a number of shortcomings. The absence of an objective measure of the depth of processing was an issue (Craik, 2002). Clear distinctions need to be made between different levels of processing to enable researchers to make more reliable and consistent conclusions and comparisons.

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