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Cognitive Task Complexity and Iranian EFL Learners' Written Linguistic Performance across Writing Proficiency Levels

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Abstract

Recently tasks, as the basic units of syllabi, and the cognitive complexity, as the criterion for sequencing them, have caught many second language researchers' attention. This study sought to explore the effect of utilizing the cognitively simple and complex tasks on high- and low-proficient EFL Iranian writers' linguistic performance, i.e., fluency, accuracy, lexical complexity, and structural complexity. At first, based on their scores on the writing test of TOFEL (2003), participants were assigned to high- and low-proficient writers. Participants in both groups first accomplished the simple task which was the narration of a story based on a set of pictures. One week later, they were asked to perform the complex task which was writing about a topic requiring reasons. Then the written productions were encoded on the measures of fluency, accuracy, lexical complexity, and structural complexity. Four two-way mixed-design ANOVAs were conducted. The results revealed that the learners significantly generated less accurate, more structurally complex, and more fluent language in the complex task. No significant effect was found for the lexical complexity measure. The high-proficient group performed significantly better in the four measures. The interaction between task complexity and writing proficiency did not yield any significant results. On the whole, based on the findings, the 'limited attentional model' was shown to be more accurate in comparison with 'cognition hypothesis' and the 'threshold level hypothesis' was not confirmed.

Keywords: cognitive task complexity, accuracy, complexity, fluency, writing proficiency level

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1. Introduction

Recently task-based instruction has received a lot of attention since it revolves around tasks which have the power of drawing learners' attention to both form and meaning (Skehan, 1998; Ellis, 2003) and hence, can occasionally direct attention towards the linguistic aspects of the language (Long & Robinson, 1998). But the question arises as to how tasks can be sequenced in a task-based syllabus.

Seeing that learners, irrespective of the sequence of what is formally taught to them, construct their own internal syllabus, i.e., built-in syllabus (Cordor, 1981), the compatibility between instruction and learners' cognitive processes as well as the allocation of psychological basis to syllabi (Kumaravadivelu, 2006) seem to be crucial. Psycholinguistically-motivated model of tasks is concerned with the psychological processes activated during language learning and production (Skehan, 1998). This cognitive information processing approach introduces the task as a device which expedites the activation of information processes (Ellis, 2000) such as noticing (Schmidt, 2001), organizing, storing, and retrieving the information. This approach also offers *cognitive complexity* as the criterion for the arrangement of pedagogic tasks (Robinson, 2007) from simple versions to approximately more cognitively demanding ones (Ellis, 2000; Foster & Skehan, 1996; Rahimpour, 2007; Robinson, 2005; Skehan, 1998; Skehan & Foster, 2001).

Tasks, in accordance with their structure which requires special amount of information processes, can impose diverse demands on the learners; this is deemed as cognitive task complexity (Robinson, 2001b) which instigates different degrees of language production's dimensions, i.e., accuracy, fluency, and complexity (Skehan & Foster, 1999).

Accuracy is defined as "the ability to avoid error in performance" (Skehan & Foster, 1999, p. 96). Fluency is "the capacity to use language in real time, to emphasize meanings, possibly drawing on more lexicalized systems" (Skehan & Foster, 1999, p. 96). According to Ortega (1999), complexity is defined as the capacity to use more complex language above one's inter-language; it embraces structural complexity (using more complex structure) and lexical complexity (using more types of words). But the question is whether the learners can devote the same amount of attention to all these dimensions while accomplishing more cognitively complex tasks in the real-time context or not.

2. Historical Background

Scrutinizing the tasks' cognitive demands and sequencing the pedagogic tasks based on their cognitive loads are of great importance so as to be able to strike a balance between all dimensions of performance and bring about a balanced inter-language. In this regard, two different views and predictions have been propounded by Skehan (1998) and Robinson (2005), namely the limited attentional model and cognition hypothesis respectively, which will be elaborated below.

2.1Task complexity and predictions

Skehan's (1998) model is based on attentional capacity and memory structure. Memory structure encompasses long term memory (LTM) and short term memory (STM). LTM consists of two representational systems: 1) *rule-based system* dealing with the abstract underlying rules and pertaining to "complexity of the underlying system" (Skehan, 1998, p. 53), i.e., accuracy and complexity and 2) *exemplar-based system* being the hoard of ready-made chunks and concerning their quick accessibility (Widdowson, 1989) in real-time production, i.e., fluency. Although STM is the only place for allocating attention (Carroll, 2008), its attentional capacity, i.e., the amount of information a person can store and process simultaneously, is limited.

Skehan (1996, 1998) contended that the attentional capacity is limited, and VanPatten (2007) referred to it as *single-resource model of attention.* Wickens (2007) perceived this attentional capacity as "a *single* 'pool' of resource" (p. 185), so learners would confront difficulties with managing more than a single task at a time. In his limited attentional capacity (LAC) model, Skehan (1998) assumed that being the primary focus of the task completion, meaning conveyance (fluency) occupies the dominant attention. In applying more cognitively demanding tasks, even more attentional resources are summoned for meaning. Consequently, the leftover attention can be directed to form (accuracy and complexity). Based on their personal priorities, task characteristics, and the context exigencies (Skehan & Foster, 1999), learners decide on either accuracy or complexity; in other words, if the learner's fluency increases, either accuracy or complexity will enhance, not both of them (Skehan, 2003).

Skehan's (1998) limited attentional model is actualized through the results of Ellis' (1987), Foster and Skehan's (1996), and Mehnert's (1998)

studies, since learners could not focus their attention both on the complexity and accuracy at the same time.

In contrast, Robinson (2005) argued that attentional capacity consists of some pools of resources, which Wickens (2007) called *multiple-resource model of attention* and based on the task demands, learners tap into these different multiple resources separately or reciprocally. In his cognition hypothesis (CH), Robinson (2001a) declared that due to these multiple pools, there would be "attention switching" (p. 307) from one pool to another, not attention prioritization which was advocated by Skehan and Foster (1999); in fact, it is "an executive/action control problem" not a "capacity problem" (Robinson, 2001a, p. 307).

Robinson (2005), based on CH, asserted that the greater processing burden of the task along resource-directing dimensions would direct learners' attention towards enriching the complexity and accuracy of their production so as to be able to overcome the more overwhelming functional/communicative demands imposed by the task structure (Robinson, 2005). Attending more to the complexity and accuracy, they would be less motivated to generate more fluent language. In his experiment, Ishikawa (2007) also demonstrated higher accuracy, more structural complexity, and more lexical variety, but less fluency for the complex task. Increase in cognitive task complexity along resource-dispersing dimensions cannot draw learners' attention towards the formal feature of the language (Robinson, 2005); in other words, the cognitive demands of these tasks overload the learners, distract their attention from linguistic codes, and, therefore, it would lead to less fluency, less accuracy, and less complexity.

So far, several studies have been conducted to investigate cognitive task complexity and their effect on different aspects of language production, mostly oral production. However, the findings are somehow inconsistent. Iwashita, Elder, & McNamara (2001) designed a study to find out the effect of planning time and +/- here-and-now conditions under testing situations. The results provided no evidence for the effect of applying the more complex task (There-and-Then condition) on fluency and complexity but the results of the accuracy demonstrated that learners significantly generated more error-free clauses in their production. Rahimpour (2007) found out that in the complex task, the participants produced less fluent, less complex, but more accurate language which was construed to the greater pragmatic demands of more complex task imposed on learners. Farahani & Meraji

(2011) who were interested in the roles of +/- planning time and +/- Here-and-Now dimensions, found out that the most complex condition led to greater syntactic complexity and greater fluency; however, no significant results were observed for accuracy and lexical complexity. Salimi, Dadashpour, & Asadollahfam (2011) also reported that more complex task resulted in less fluency and more complexity; however, no significant results were found for the complexity.

2.2 Task complexity and writing proficiency level

Robinson (2007) stated that for sequencing pedagogic tasks, the only criterion that should be taken into account is task complexity since it concerns task factors without considering learners' differences (within/intra learner variable) and can be the focus of a prior syllabi and planning decisions (Van Lier, 1991). But should proficiency level be regarded as a moderator factor affecting performance? Cummins (1979b), in his threshold level hypothesis, declared that "those aspects…that might positively influence cognitive growth are unlikely to come into effect until…[the learner] has attained a certain minimum or threshold level of competence in a second language" (p. 239); so, for being effective, any task requires a minimal level of proficiency. Accordingly, proficiency level can be deemed as an influential factor.

In their study, Kuiken and Vedder (2008) rejected Cummins' (1979b) threshold hypothesis since they observed no interaction between task complexity and *language proficiency level* by analyzing participants' *written* production. The appealing point is that, as Bachman (1990) asserted, when learners are generally located at a high level of proficiency, it does not mean that they are at a high level in every aspect of language. Writing proficiency is dissimilar from language proficiency; writing process, besides vocabulary and syntax, comprises coherence and cohesion (Chastain, 1988) and requires literacy skills (Cummins, 1979a).

3. Objective and Research Questions

The current study is set out to shed light on the possible effects of manipulating cognitive task complexity on different aspects of Iranian EFL learners' written production across high and low writing proficiency levels. The following questions are addressed in this study:

1. Is there any significant difference in the accuracy of high- and low-proficient writers while doing the simple and complex tasks?

2.Is there any significant difference in the fluency of high- and low-proficient writers while doing the simple and complex tasks?
3.Is there any significant difference in the lexical complexity of high- and low-proficient writers while doing the simple and complex tasks?
4.Is there any significant difference in the structural complexity of high- and low-proficient writers while doing the simple and complex tasks?

4. Method

4.1 Participants

One hundred and eighteen learners took the writing section of TOEFL (Educational Testing Service, 2003). All of them were Iranian EFL learners, all female, aged 16 to 26 and they, being non-English major students, were chosen from the Zabansara Institute in Zanjan, Iran. Based on the results, 27 students whose scores were 0.5-1.5 SD above the mean and 27 students whose score were 0.5-1.5 SD below the mean were assigned to high and low groups respectively.

4.2 Materials

The writing section of the TOEFL (Educational Testing Service, 2003) was used to group the learners as low and high-proficient writers. The reason for administering just the writing section of the TOEFL is that using general proficiency tests for investigating learners' writing abilities has been subjected to criticism (Cooper, 1984) since in such tests learners are more involved in recognition than production.

An eight-frame picture story (Appendix A), taken from Yule (1997), was the next instrument. This structured narrative task had a tight structure (Ellis, 2003), i.e., the story of the task had a clear plot, from beginning up to the end (Tavakoli & Skehan, 2005). Using pictures as prompts makes a task easier to be executed because they are concrete, immediate (Skehan, 1998), + Here-and-Now (Robinson, 2001b), and contextually embedded (Cummins, 1983).

The third instrument, the complex task, was an opinion task (Ellis, 2003). Participants were asked to write about the following topic taken from Skehan and Foster (1999):

> You are going to be taken to a deserted island to live there for a month. You can only take three pieces of equipment with you. Write down what you would like to take with you and give reasons for your choice.

As is clear, this task had a loose structure, i.e., there was no plain chronological sequence, nor recognizable macrostructure (Tavakoli & Skehan, 2005). It was more abstract, remote (Skehan, 1998), There-and-Then (Robinson, 2001b) (i.e., tasks without contextual support), context reduced (Cummins, 1983), and self-provided (Ellis, 2003). Learners had to make decisions based on their own experience and prior knowledge, and provide reasons for their decisions. As indicated in Table 1, the aforementioned points can be attributed to its greater cognitive demand (Ellis, 2003).

Table 1. Specification of the simple and complex tasks based on Ellis' (2003, p. 223) criteria for grading tasks

		Simple task	Complex task
Input	1 Medium	**Pictorial**	**Written**
	2 Organization	**Tight structure**	**Loose structure**
	3 Information type	**Dynamic**	**Abstract**
	4 Context dependency	**Here-and-Now**	**There-and-Then**
Conditions	1 Information configuration	Shared	Shared
		One-way	One-way
	2 Interactant relationship	Optional	Optional
		Convergent	**Divergent**
	3 Interaction requirement	Exchanging information	Exchanging reasoning
	4 Orientation	Monologic	Monologic
Outcomes	1 Cognitive		
	2 Discourse mode:	Written	Written
		Narration	**Argumentation**
	1 Medium	Closed	Open
	2 Discourse domain		
	3 Scope		

4.3 Data collection procedures

At first a pilot study was conducted in order to set the time required for accomplishing the writing tasks. Similar participants were asked to perform the tasks with no time limit. Following Ellis and Yuan (2004), the time was set based on the time the fastest writer accomplished the task, i.e., 15 minutes in this study. Then in order to determine high and low writing

proficiency groups, the written section of the TOEFL was administered. The written productions were scored by two experienced EFL writing teachers using Jacobs, Zingraf, Wormuth, Hartfiel, and Hughey's(1981, cited in Weigle, 2002, pp. 115-116) scoring profile. It encompasses five components including content, vocabulary, language, organization, and mechanics.

The inter-rater reliability of the scores was checked using Cronbach's alpha (α =.86). The descriptive analysis of the scores showed the mean of 64.9 and the standard deviation (SD) of 14.4. Twenty- seven of the students whose scores were 0.5-1.5 SD above the mean and 27 students whose scores were 0.5-1.5 SD below the mean were assigned to high and low groups respectively.

Performing the simple task, participants in both groups were asked to write a 150-word story about the set of pictures as soon as they received the papers in 15 minutes. The pictures were available while they generated their stories. One week later they accomplished the complex task and wrote about the aforementioned topic in 15 minutes.

4.4 Data analysis

This study focused on two independent variables (task complexity and writing proficiency level) and one dependent variable at a time, accordingly, four two-way mixed-design ANOVAs, whose results are reported below, were run.

Accuracy was measured by "the proportion of error-free t-units to t-units" (Larsen-Freeman, 2006, p. 597) and any "errors in syntax, morphology and lexical choice" (Ellis & Yuan, 2004, p. 72) were counted up and errors in spelling, punctuation or capitalization were ignored. Fluency was gauged by "average number of words per t-unit", structural complexity by "average number of clauses per t-unit", and lexical complexity by Mean Segmental Type Token Ratio, MSTTR, which equals "word types per square root of two times the words" (Larsen-Freeman, 2006, p. 597) respectively. Larsen-Freeman (2006) maintained that the best measures for evaluating the written language development are the aforementioned measures.

5. Results

Initially the written outputs were encoded based on the aforementioned measures. It is noteworthy that in order to be allowed to run parametric tests, the normality of distribution was checked for all sets of data (Table 2).

Table 2. One-sample Kolmogorov-Smirnov tests of the participants' performance in terms of accuracy, fluency, lexical complexity, and structural complexity

Measures		Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)	Measures		Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
AC	HS[1]	.562	.910	FL	HS	.537	.935
	HC	.428	.993		HC	.761	.609
	LS	.608	.853		LS	.554	.919
	LC	.758	.614		LC	.467	.981
LC	HS	.557	.915	SC	HS	.405	.997
	HC	.405	.997		HC	.947	.331
	LS	.424	.994		LS	.461	.984
	LC	.593	.874		LC	.648	.795

[1]. HS = High group performing the Simple task, HC = High group performing the Complex task, LS = Low group performing the Simple task, LC = Low group performing the Complex task, AC = Accuracy, FL = Fluency, LC = Lexical Complexity, SC = Structural Complexity.

As seen in Table 2, the data were normally distributed since the levels of significance for all sets were greater than .05.The descriptive statistics of participants' performance in terms of the four variables are demonstrated in Table 3.

Table 3. Descriptive statistics of participants' performance in the simple and complex tasks in terms of accuracy, fluency, lexical complexity, and structural complexity

Measures	HS		HC		LS		LC	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
AC	0.75	0.09	0.67	0.15	0.54	0.12	0.48	0.20
FL	8.48	1.59	12.9	3.77	7.41	1.35	10.3	3.26
LC	4.20	0.62	4.30	0.63	3.40	0.29	3.29	0.70
SC	1.66	0.31	2.41	0.80	1.36	0.27	2.16	0.71
Measures	HG		LG		ST		CT	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
AC	0.71	0.13	0.51	0.17	0.65	0.15	0.57	0.20
FL	10.7	3.66	8.88	2.88	7.94	1.55	11.6	3.73
LC	4.25	0.62	3.35	0.54	3.807	0.63	3.800	0.84
SC	2.03	0.71	1.76	0.67	1.51	0.33	2.28	0.76

[1]. HG = High Group, LG = Low Group, ST = Simple Task, CT = Complex Task.

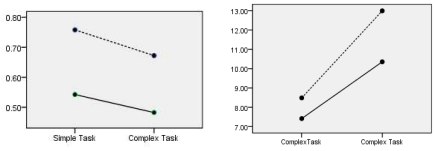
The first question concerns the effect of applying different degrees of task complexity on accuracy across writing proficiency level. Table 3 demonstrates that irrespective of their proficiency level, learners made less gramatical errors in ST ($\bar{X}_{ST}$ = .65) than in CT ($\bar{X}_{CT}$ = .57). Results in Table 4 reveal that this difference is significant and meaningful (η_{p2} = .1) (Cohen, 1988), i.e., F (1, 52) = 7.84, p < .05. Table 4 also indicates the significant and meanignful main effect for proficiency level, i.e., F (1, 52) = 39.7, p < .05, η_{p2} = .4. As seen in Table 3, the mean of ST in HG is higher than any other means. Table 4 reports the lack of meaningful interaction between task complexity and writing proficiency level along accuracy, i.e., F (1, 52) = .24, p > .05

Table 4. The results of four two-way mixed design ANOVAs for task complexity across writing proficiency levels

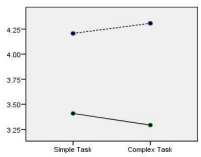
Measures	Task Complexity				Writing proficiency level				level*Task complexity		
	F	d	*P*	ηp	*F*	d	*p*	ηp	*F*	df	*P*
AC	7.8	1,5	0.00	0.	39.	1,5	0.00	0.	0.2	1,5	0.6
FL	4	2	*	1	7	2	*	4	4	2	2
LC	56.	1,5	0.00	0.	11.	1,5	0.01	0.	2.5	1,5	0.1
SC	5	2	*	5	6	2	*	1	1	2	1
	0.0	1,5	0.94	....	56.	1,5	0.00	0.	1.0	1,5	0.3
	01	2	0.00	.	6	2	*	5	3	2	1
	48.	1,5	*	0.	5.8	1,5	0.01	0.	0.0	1,5	0.7
	1	2		4	7	2	*	1	6	2	9

Note. *Statistically significant at the level of p<.05.

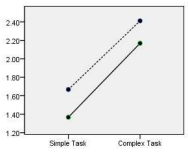
It is visually obvious from Figure 1(A). The performance pattern from ST to CT in both groups are approximately the same. Appendix B demonstrates the performance of participants of two groups with different language proficiency levels in ST and CT in four areas of accuracy, fluency, and lexical and structural complexity.



A: AC B: FL



C: LC



D: SC

Note: ----: HG; ——: LG.

Figure 1. Cognitive task complexity across writing proficiency levels in terms of accuracy, fluency, lexical complexity, and structural complexity.

The second question concerns the effect of task complexity and writing proficiency level on fluency. The results demonstrated that the difference between participants' performance in ST ($\bar{X}_{ST}$ = 7.94) and CT ($\bar{X}_{CT}$ = 11.6) (Table 3) is statistically significant, i.e., F (1, 52) = 56.5, p < .05 (Table 4) and meaningful (η_p^2 = .52). Table 4 also illustrates that writing proficiency level had a significant main effect on fluency, F (1, 52) = 11.6, p < .05, with a high effect size estimation (η_p^2 = .1); therefore, it can be stated that HG ($\bar{X}_{HG}$ = 10.7) could generate more words in comparison with LG ($\bar{X}_{LG}$ = 8.88) (Table 3). Table 3 reports that HG produced the most number of words in CT; but the interaction between writing proficiency level and task complexity had weak effect on fluency, i.e., F (1, 52) = 2.51, p > .05 (Table 4). Figure 1(B) makes this point clearer.

The third question addresses the effect of applying the simple and complex tasks across writing proficiency level on lexical complexity. The resultsof two-way mixed-design ANOVA reveal no statistically significant difference in the performance of participants accomplishing ST and CT, i.e., F (1, 52) = .001, p > .05 (Table 4). Surprisingly, learners did almost equally well in both tasks ($\bar{X}_{ST}$ = 3.807 and $\bar{X}_{CT}$ = 3.800) (Table 3). Considering the effect of writing proficiency level on lexical complexity, significant and meaningful main effect was found, i.e., F (1, 52) = 56.6, p < .05, η_p^2 = .5 (Table 4); in other words, HG ($\bar{X}_{HG}$ = 4.25) significantly and meaningfully did better in comparison with LG ($\bar{X}_{LG}$ = 4.35) (Table 3). Looking into the synergetic effect of both task complexity and writing proficiency level, their interaction had no consideable effect on lexical complexity, F (1, 52) = 1.03, p > .05(Table 4). Figure 1(C) shows this result patently.

The last question explores the possible effect of applying task complexity across writing proficiency level on structural complexity. Task complexity had significant and meaningful effect on structural complexity, i.e., $F(1, 52) = 48.1$, $p < .05$, $\eta_p^2 = .4$ (Table 4). In fact, higher gains in structural complexity were attained by the participants performing ST ($\bar{X}_{ST} = 1.51 < \bar{X}_{CT} = 2.28$ [Table 3]) regardless of their writing proficiency level. Writing proficiency level also led to statistically significant results, i.e., $F(1, 52) = 5.87$, $p < .05$, $\eta_p^2 = .1$ (Table 4). HG generated significantly more complex clauses ($\bar{X}_{HG}=2.03$), in comparison with LG ($\bar{X}_{LG} = 1.76$) (Table 3). The interaction between task complexity and writing proficiency level has no significanteffect on structural complexity, i.e., $F(1, 52) = .06$, $p > .05$ (Table 4). Figure 1(D)also indicates the point.

6. Discussion

6.1 Accuracy

The processing load for the accomplishment of the simple task was not large since the task was supported by the pictures (i.e., + Here-and-Now condition) (Appendix A) that "contain clear inherent structure, particularly in terms of time sequence" (Skehan & Foster, 1999, p. 99), and a lucid story plot. This task did not require the learners to use their imagination to come up with the content of the task; as a result, participants could conceptualize the content quickly. As Levelt (1989) stated, owing to the quick conceptualization, they had more time to focus on the formulation of a plan and articulation of that plan for meeting the communicative goal. To put it in other terms, they had more time to focus on formal features. Devoting more attentional capacity to the formulation of their content brought about the production of more error-free clauses. Whereas in the complex task, they had to browse their world knowledge in order to come up with the content of the task. This extra cognitive load drew some of their attention away from the formulation process, which led to their less accurate production.

The findings of some studies such as Ellis (1987), Skehan and Foster (1999), and Tavakoli and Skehan (2005), which were similar to the result of this study, indicated a cutback in the accuracy measures due to task complexity. These researchers concluded that more structured and simpler tasks would leave much more room for accuracy and the formulation stage (the second stage of *model of production* introduced by Levelt [1989]) as the requirement of the conceptualization stage (the first stage of production),

was eliminated in these types of tasks and the processing load would be moderated.

Regarding the effect of writing proficiency level on accuracy, the high-proficient group significantly produced more error-free clauses in comparison with the low group. It can be stated that the high group, maybe due to the fact that they naturally had more exposure to English language and had more experience in writing, possessed more accurate lexicalized stem sentences (Pawley & Syder, 1983); therefore, for generating some parts of their production, they just retrieved these sentences and filled the blank spots of them with words related to this specific context. Consequently they processed the formulation stage more accurately and had quick access to those lexicalized stem sentences; accordingly, they save more time for on-line planning so as to monitor their output. Tavakoli and Skehan's (2005) study reached the same conclusion.

No significant effect for the interaction between task complexity and writing proficiency level was observed. Kuiken and Vedder (2008) also reached the same conclusion, and as a result, disconfirmed the Cummins' (1979b) threshold hypothesis.

6.2 Fluency

Regarding fluency, EFL Iranian learners generated greater number of words in the complex task. This finding aligns with Skehan's (1998) limited attentional capacity model. Due to their restricted attentional span, the participants couldn't deal with different tasks at a time. In task accomplishment, given that the core purpose of performing tasks was meaning conveyance and communication (Bygate, Skehan, & Swain, 2001; Ellis, 2003; Prabhu, 1987; Skehan, 1998), learners endeavored to complete the task intelligibly. In the case of more cognitively complex tasks, so as to overcome both extra processing load and the real-time pressure, they tapped more into their exemplar-based system which was replete with lexicalized items (Skehan, 1998). All these gave rise to more fluency.

These findings can also be attributed to +/-Here-and-Now dimension (Robinson, 2005, 2007). Since in the simple task learners were provided with the information they needed, they were not required to pay particular attention to the meaning and to browse their memory to find the content. They just made an attempt to retrieve the exact words required by the pictorial prompt. While in the complex task learners just had to rely on their memory and world knowledge. Their reliance on memory propelled them to

tap into their memorized events and ready-made lexical items, and consequently retrieve more lexical items in less amount of time, all of which led to the production of more fluent language. This finding is consistent with what Ishikawa (2007) and Mehnert (1998) concluded in their studies.

Concerning fluency across writing proficiency levels, the high group generated a greater number of words in comparison with the low group. It can be deduced that in the process of proceduralization (Skehan, 1996), the declarative knowledge turns into the procedural knowledge which is automatic, fluent, and requires less attentional capacity. High-proficient learners naturally possessed more proceduralized knowledge (Anderson, 1983) and had a quick access to their stored knowledge in the real-time communication. For this reason, the high group of this study could produce words in the allotted time and accordingly, generate more fluent language than the low group who were still developing their declarative knowledge (Johnson, 1996) and how to use that knowledge for their communicative purpose.

No interaction between task complexity and writing proficiency level was revealed for fluency. The contribution of both proficiency level and task complexity was not confirmed by Ortega's (1999) study as well.

6.3 Lexical complexity

The findings for the lexical complexity measures revealed almost the same scores for both tasks. Ortega (1999), Ishikawa (2007), Kuiken and Vedder (2008), and Meraji (2009) found no statistically significant effect for lexical range, neither did the present study. Ellis and Yuan also (2004) asserted that owing to having enough time, learners, while accomplishing the written task, could search for more lexical items. Meraji (2009) argued that maybe the task structure did not require his participants to generate a wider range of lexical items.

In the present study, writing proficiency level had a significant effect on lexical complexity. In his study, Kawauchi (2005) reported the same results and could provide evidence that regarding complexity, among all the participants, high-proficient ones gained the best (2005). Kiuken and Vedder (2008) also showed that proficiency level made a significant effect on lexical complexity in the performance of both Italian and French participants.

The high group's better performance can be attributed to their more powerful exemplar-based system. This powerful system offered more lexical

options to be utilized during the real-time pressure. Each of their choices contained a number of different words which had been stored as a single item in their memory; therefore, they would retrieve more variety of lexis in the appointed time. Their greater procedural knowledge also facilitated the retrieval of the lexicalized items more quickly and brought about the high speed of processing some words at a time. On the contrary, since the low group lacked a considerable amount of memorized vocabulary, they had difficulty dealing with finding words and could not retrieve different range of vocabularies which neither existed nor were proceduralized yet. Regarding the interaction between task complexity and writing proficiency level, this study found no significant effect.

6.4 Structural complexity

Regarding structural complexity, the participants produced less complex language in the simple task, which is in line with Ishikawa's (2007) findings. The complex task in this study had to do with writing about a topic which required providing reasons; therefore, it pushed learners to use interpretation and evaluative comments (Kawauchi, 2005) to justify their ideas. This greater cognitive processing required higher levels of awareness and deeper semantic processing (Givón, 1985). Ishikawa (2007) claimed that by increasing the cognitive demands on memory, learners were inclined to produce more embedded and subordinating means and "manipulating task complexity may have motivated a shift from a less to a more advanced mode of planning, where complex representations were formed" (p. 149); therefore, in this study while performing the complex task, the participants devoted more attention to the complexity of their productions and generated more structurally complex language. In a similar vein, Long (1985) declared that one way of extending one's inter-language is to employ more complex tasks.

About the impact of writing proficiency level on the structural complexity, the results demonstrated that the more proficient the learners were, the more complex structure they generated. The high group had enough proceduralized knowledge which assisted them to retrieve effortlessly (Kawauchi, 2005). The high pace of their access saved more time to be dealt with the complexity of the output. But the low group had not proceduralized their declarative knowledge yet and was too busy with the content of the task to attend to form. Maybe their L2 knowledge was too low for the production of more structurally complex language.

No significant effect was found for the interaction between task complexity and writing proficiency level. In their study, Kuiken and Vedder (2008) also found no significant interaction between them. They concluded that there was no mutual effect of cognitive task complexity and language proficiency.

7. Conclusion

After years of instruction, most learners cannot strike a balance between different dimensions of performance. Some dimensions lag behind others. Finding the best way to orient learners' attentional resources to different aspects of production in different occasions is of paramount importance.

The impetus to conduct this study was cognitive task complexity and different proposals offered by Skehan's (1998) LAC and Robinson's (2001a, 2001b) CH. In the present study applying task complexity made the participants produce less accuracy, more fluency, more structural complexity, and insignificant lexical complexity. Skehan's (1998) LAC model is more compatible with the findings of this study than Robinson's (2005) CH.

As it was forecasted by the LAC model, there was a tradeoff between accuracy and complexity. Due to the limited attentional capacity, the participants couldn't focus on all dimensions of the performance simultaneously and preferred to expand their leftover attentional capacity on taking risks and going beyond their existing inter-language.

The comparison between the low and high groups' performance demonstrated that their written outputs corresponded with their level of writing proficiency. That is because the high group had greater cognitive capability (Cummins, 1979a), larger number of formulaic items, lexicalized stem sentences (Pawley & Synder, 1983), and more proceduralized knowledge; so they needed less attentional capacity, which saved more time for monitoring the output grammatically, generating more complex language, and even retrieving more items from memory. On the contrary, the low group was in their early stages of writing proficiency; therefore, their "central executive" system (Carroll, 2008) was occupied with highly controlled processing.

The other hypothesis under question was Cummins's (1979b) threshold hypothesis which claims that low-proficient learners cannot benefit from doing complex tasks since they do not possess enough L2 cognitive development. This study provided no evidence for the corroboration of this

hypothesis since no interaction between writing proficiency level and task complexity on different dimensions of performance was observed; so, applying task complexity can be useful for any writing proficiency level.

The current study can inform teachers, syllabus designers, and material developers about the selection and gradation of tasks in a way that suits the needs of particular L2 learners. If teachers find out their learners are faced difficulty with fluency, they can exploit more cognitively complex tasks so as to call their attention to fluency; or if their high-proficient learners generate less accurate and less structurally complex language, the employment of simple tasks can diminish their problem. In case of low-proficient writers, more complex tasks can lead to higher gains in structural complexity. The teachers should be acutely aware of these nuances in order to assist their learners to develop a balanced inter-language.

This study had some limitations. Maybe the criteria used to operationalize different dimensions of performance are not the best representations of what they claimed to measure. The severity of the scorer and "the severity of the errors" (Polio, 1997, p. 112) were not gauged. The adaptation of all participants in this study from one institution, the use of just two types of tasks, and the number of participants can also be some threats to the generalizablity of the results.

Some important but apparently overlooked points are learners' individual characteristics, their learning style, and their preferred strategies. These points have been shown to be determining factors in second language production and development (Ellis, 2008). Therefore, the effect of learning styles and strategies on learners' linguistic performance (i.e., accuracy, complexity, and fluency) while doing simple and complex tasks can also be a good trigger for future research.

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Appendices

Appendix A: Prompt for the Simple Writing Task, Taken from Yule (1997, p. 67)

Begin the story like this: Today, a woman goes to the supermarket…

Appendix B: The comparison of the low and high groups' performance in the simple and complex tasks in terms of accuracy, fluency, lexical complexity, and structural complexity