The Impact of Task Complexity along Single Task Dimension on EFL Iranian Learners' Written Production: Lexical complexity

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Abstract
Based on Robinson’s Cognition Hypothesis, this study explored the effects of task complexity on the lexical complexity of Iranian EFL students’ argumentative writing. This study was designed to explore the manipulation of cognitive task complexity along +/-single task dimension (a resource dispersing dimension in Robinson’s triadic framework) on Iranian EFL learners’ production in term of lexical complexity. To this end, based on the results of the writing test of TOFEL (2004), 48 learners were selected and assigned to two groups, simple task group (STG, n= 24) and complex task group (CTG, n= 24) randomly. The participants in the STG were given an eight-frame picture which had been arranged in the correct sequence before its administration (+single task). These participants were required to order the frames in the right sequence first, before starting writing (- single task). Their output was encoded based on the measures of lexical complexity. The null hypothesis was nullified since the results indicated positive significant impact of +/-single dimension on lexical complexity. Regarding the results of the present study, it can be stated that when the participants were engaged putting the pictures in their correct order in the complex task, they carried out deeper semantic processing in order to find the reasonable order, which might lead to the better activation of their exemplar-based system and made them browse it more deeply. It was found that, at least in the Iranian context, Robinson’s (2005) predictions were more convincing.

Keywords: Iranian EFL students, lexical complexity, +/-single task dimension, task complexity, triadic componential framework

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It is becoming increasingly difficult to ignore the effect of the task complexity on Iranian EFL learners’ L2 lexical complexity. It has attracted the attention of many researchers, language teachers, materials developers, and syllabus designers. It stresses the transactional and interactional use of language (Kormos & Trebits, 2012; van Waes & Leijten, 2015). Tasks also can enhance the cognitive processes required for the development and acquisition of L2 (Robinson, 2003).

Lexical ambiguity is one of the most heavily investigated topics in Psycholinguistics. There is a good evidence, particularly from quite a recent research, that multiple meanings of a lexically ambiguous word are stored together in the lexicon. The evidence is provided by studies which shows that occurrence of an ambiguous word makes both its relevant and its irrelevant senses momentarily available, even if sentence context makes it quite clear which sense is appropriate. Various definitions have been proposed by different experts (e.g., Bachman & Palmer, 1996; Breen, 1989; Bygate, 1999; Bygate, Skehan & Swain, 2001; Crookes, 1986; Lee, 2000; Long, 1985; Nunan, 1989; Richards, Platt & Weber, 1985; Skehan, 1996, 1998; Swales, 1990). Skehan (1996) defines a task as “an activity in which meaning [rather than form] is primary, there is some sort of relationship to real-world activities, task completion has some priorities, and assessment of task performance is in terms of task outcome” (p. 38) “not in terms of language display” (Skehan & Foster, 1999, p. 94). However, there has been little discussion about Task Complexity and Lexical Complexity in Iran and to the best of our knowledge, this seems to be the first report.

The significance of this study is that task conditions and features exert an influence on directing attention towards the formulation processes. This demonstrates the significance of investigating task conditions and their impact on attention while L2 writing being accomplished. However, some task conditions, due to various unknown reasons, have not received the attention they deserve, and one of them is + single task from Robinson’s (2005) framework. The main strong claim of this approach is that it can activate the cognitive and acquisitional processes while learners are busy performing tasks and accomplishing their goals (Skehan, 2003). Recently, the effect of task characteristics on learners’ language production and
development is hotly debated (Bygate, 1999; Ellis, 2003; Masrom, Daud, & Alwi, 2015; Robinson, 2003, 2005; Schmidt, 1993; Skehan & Foster, 2001; Tavakoli & Foster, 2008). Another motivation for conducting this study is theoretically-based. The next point is that in Iran, which is a foreign language context, most learners do not develop a balanced interlanguage regarding different dimensions of production, and most of them have problems in fluency and have difficulty performing tasks in real-life tasks. In Iran, there is not enough opportunity to be exposed to the English language due to the fact that English is not used outside the classroom; therefore, it is up to teachers, syllabus designers, and materials developers to provide tasks with different conditions and characteristics to fill this gap. Nevertheless, this purpose required a lot of research. This study might be a good contribution to them in this regard. Hence; the purpose of this paper was to review the recent research on the effect of the task complexity on Iranian EFL learners’ L2 lexical complexity.

**Review of Literature**

In recent years, there has been an increasing amount of literature on Lexical complexity. It is defined as the ability to produce more lexical varieties and different types of words. In this study, it was measured by “the sophisticated type–token ratio” (Larsen-Freeman, 2006, p. 597) or Mean Segmental Type Token Ratio (MSTTR) which equals “word types per square root of two times the words” (Larsen-Freeman, 2006, p. 597). Ellis (2000) asserts that MSTTR cancels out the effect of the text length while Type-Token ratio (the other prevalent measure used for lexical complexity) is sensitive to text length; as a result, MSTTR was preferred.

Tasks, as the main units of task-based language teaching (TBLT), are strongly claimed to be graded in the syllabi based on their various characteristics (Robinson, 2001a, 2005, 2007a; Skehan, 1998, 2003). Gilabert (2004) and Robinson (2005) have declared that the best criterion for such sequencing in a principled way is cognitive task complexity which is “the result of intentional, memory, reasoning, and other information processing demands” (Robinson, 2001a, p. 29); therefore, it pertains to the degree of cognitive demands that the task imposes on the learners while
doing the task (Ellis, 2003). Robinson (2005) states that “pedagogical tasks [should] be sequenced for learners on the basis of increasing in their cognitive complexity” (p. 1) and strongly recommends cognitive complexity as the “theoretically motivated, empirically substantial, and pedagogically feasible sequencing criteria” (Robinson, 2001a, p. 27) for the purpose of assisting learners in developing a balanced interlanguage regarding accuracy, fluency, and complexity. Many experts (Ellis, 2003, 2008; Robinson, 2005, 2007a, 2007b; Schmidt, 2001; Skehan, 1996, 1998, 2003; VanPatten, 1996, 2007; Wickens, 2007) in cognitive issues referred to memory and attention as the most important factors in cognitive processes.

**Memory in Cognitive Processes**

Three types of memory are identified (Ellis, 2008):

1. *Sensory memory:* it maintains the perceived data for a very short time in an iconic or echoic manner;
2. *Working/short-term memory:* the main processes of attention, perception, and rehearsal are accomplished in this memory in order for the data to be ready to store in an organized manner in the long-term memory, and the limited capacity of working memory hinders the proper information processing, therefore, with regard to language production or comprehension, learners cannot cope with all aspects in the input or output instantaneously, and as a result, they are propelled to overlook some dimensions;
3. *Long-term memory:* the analyzed data are stored in this memory. There are two different systems in this memory (Skehan, 1998). The exemplar-based system consists of large number of ready-made chunks and formulaic units. These units are stored as a whole and their components are not analyzed grammatically while retrieved. The components of this system are useful in the real-time production, since their retrieval is not required any controlling analysis and they are summoned as a whole. So, the major benefit of this system is their quick accessibility (Widdowson, 1989) in the real-time performance.
Attention in Cognitive Processes

Attention is “a cognitive process involving the ability to select and focus on particular stimuli from the environment while ignoring others” (VanPatten & Benati, 2010, p. 65). Recently, what draws a lot of attention to itself is Schmidt’s (2001) noticing hypothesis. In its strong version, it states “although unattended stimuli may have subtle but undeniable effects on humans (as in subliminal perception experiments), it is widely argued in psychology that learning without attention to what is to be learned is impossible” (Hulstijn & Schmidt, 1994, p. 17). In other words, this theory states that in order to learn, learners’ conscious attention is required. In fact, “awareness at the level of noticing” (Schmidt, 1990, p. 134) is a critical condition for acquisition.

Two models of attention are propounded:

Single-resource model of attention. The assumption of this model is that the whole processing capacity is “a single ‘pool’ of resource” (Wickens, 2007, p. 185); therefore, it can be stated that human beings can deal with just one task at a time, and attending to more than one task would be very awkward and sometimes impossible for them. As a result, when they face a challenging task, more attentional capacity of this single resource would be occupied and consumed for the accomplishment of that, and greater pressure would be imposed on attentional capacity. Regarding language learning, while producing language, learners cannot focus on all three aspects of language production, namely, accuracy, fluency, and complexity (Skehan & Foster, 1999). As VanPatten (1996, 2007) declares, while doing some tasks, learners’ first attention is on the meaning and content words in input processing, or as Skehan (1998) articulates, on the retrieval of words from the exemplar-based system in language production. So, the dominant focus would be on fluency, while learners are doing a task, at the expense of other aspects of production. This is due to the learners’ controlled processing, unlike the native speaker whose processing is mostly automatic, which can overwhelm their attentional resources (Skehan & Foster, 2001). This model of attention is mostly advocated by VanPatten (1990, 2002, 2007) and Skehan (1996, 1998).
Multiple-resource model of attention. The other, different, view of attention, being supported by Robinson (1995a, 2001a, 2001b, 2005, 2007a, 2007b) and Wickens (1980, 2002, 2007), is that attentional capacity is not a container with one single resource, but it is comprised of multiple resources, and depending on resource demands, resource similarity, and allocation policy between the two tasks (Wickens, 2007), human beings utilize one or more than one resources without any interference. Four types of resources are introduced by Wickens (2007) as follows: processing stages (perception/cognition [encoding & central processing]/responding distinction), processing modalities (visual/auditory distinction), processing codes (verbal/spatial distinction), and processing response (manual/vocal distinction).

Models of Task Complexity
Two different models have been propounded regarding the effect of task complexity on the learners’ performance:

Skehan’s limited attentional capacity model. In this model, Skehan, advocating the single-resource model of attention and proposing dual-mode of processing in which the learners activate both rule-based and exemplar-based systems to different degrees based on the requirements of the tasks, it is claimed “learners cannot attend to everything equally” (Skehan & Foster, 1999, p. 96) and concurrently. As a result, based on the demands of the present context, they prioritize one aspect (for example, the exemplar-based system) over another dimension such as the rule-based system. In order to elaborate their model, Skehan and Foster (1999) define three production aspects as follows:

[Fluency means] the capacity to use language in real time, to emphasize meanings, possibly drawing on more lexicalized systems.…[Accuracy means] the ability to avoid error in performance, possibly reflecting higher levels of control in the language, as well as a conservative orientation, that is, avoidance of challenging structures that might provoke error.…[Complexity means] the capacity to use more advanced language, with a greater willingness to take risks, and use fewer controlled language subsystems. This area is also taken to
correlate with a greater likelihood of restructuring, that is, change and development in the interlanguage system. (p. 96)

According to their model, tasks are meaning based activities; therefore, the dominant attention would be devoted to the fluency and rapid retrieval of ready-made chunks from exemplar-based system. When learners feel they cannot solve the problem just through the exemplar-based system, they utilize their rule-based system; hence, due to various reasons such as task conditions, personal characteristics, or learning and cognitive styles, the remaining attention would be devoted to increase the accuracy or complexity of their production. To put it in other words, when the cognitive complexity of the task is increased, it is more probable that the learners call even more attention to the meaning conveyance and enhancing their fluency for the purpose of accomplishing the task goal successfully. Since the attentional capacity is limited and is a single pool with the dominant space occupied by the fluency, the leftover attention can be devoted to either accuracy or complexity, so, just one of them can be improved at the expense of the other, meaning that, there is an intra-form tradeoff between retrieving their existing structural features (i.e., accuracy) or constructing new forms based on their existing linguistic features and hypotheses (complexity). On the whole, this model predicts that boosting the complexity of the task would bring about greater fluency along with either greater accuracy or complexity (+fluency, -accuracy, +complexity or +fluency, +accuracy, -complexity).

**Robinson’s cognition hypothesis.** Robinson (2001a, 2005, 2007a, 2007b), like Wickens (1980, 2002, 2007), advocates the multiple resources model of attention. In his model, he argues that attention can be allocated to various tasks if they do not belong to the same domain. According to this model, there are various resource pools, rather than just one resource pool, and there is no general limitation on utilizing the pools simultaneously; hence, what occurs is switching attention from one resource pool to another, not prioritizing attention; to put it in Robinson’s (2001b) terms, it is “an executive/action control problem” (p. 307), not a “capacity problem” (p. 307). He declares models of attention no longer focus on its limited
capacity. In his model, what Robinson (2001a, 2005) pin points is that the augmentation of the task complexity would increase the processing load and this processing would lead to less fluent language; however, this can be compensated by “using specific features of the language code” (Robinson, 2001a, p. 31). This is in line with what Givon (1985) declares, “structural complexity tends to accompany functional complexity” (p. 1021). To put it simply, the increase in the cognitive complexity of the task would result in the learners’ spending substantial attention on the syntactic aspects of their performance, i.e., accuracy and complexity, on the other hand, in the learners’ drawing less attention to the meaning and fluency of their language. To sum up, according to cognition hypothesis, if the complexity of the task boosts, based on the procedure of complexification, two different results would come up: either -fluency, +accuracy, +complexity, or -fluency, -accuracy, -complexity.

**Robinson’s Triadic Componential Framework**

Based on the cognition hypothesis, Robinson (2001b) introduces a framework consisting of three dimensions, namely, task complexity, task difficulty, and task condition. Table 1 indicates this triadic framework.

**Table 1**

*Robinson’s (2005, p. 5) Triadic Componential Framework*

<table>
<thead>
<tr>
<th>Task complexity (Cognitive factors)</th>
<th>Task conditions (Interactional factors)</th>
<th>Task difficulty (Learner factors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) resource-directing variables e.g., =few elements =Here-and-Now =no reasoning demands</td>
<td>(a) participation variables e.g., open/closed one-way/two-way convergent/divergent</td>
<td>(a) affective variables e.g., motivation anxiety confidence</td>
</tr>
<tr>
<td>(b) resource-dispersing e.g., =planning =single task =prior knowledge</td>
<td>(b) participant variables e.g., same/different gender familiar/unfamiliar power/solidarity</td>
<td>(b) Ability variables e.g., working memory intelligence aptitude</td>
</tr>
</tbody>
</table>

As Table 1 presents, one of the dimensions is task conditions under which the tasks are accomplished. This concerns the interactive demands of accomplishing tasks. It is comprised of two subparts: participation variables regarding the information-flow (e.g., one-way vs. two-way) and participant variables with respect to familiarity or gender.

The other dimension is task difficulty which is “learners' perceptions of the demands of the task, and is dependent on differences between learners in the cognitive factors (e.g., aptitude, working memory) and affective variables (e.g., anxiety, confidence) that distinguish one learner from another” (Robinson, 2003, p. 56). This aspect pertains to the learner factors and the way learners perceive the difficulty of the task (Robinson, 2001a, p. 31); therefore, it is an inter-learner variable.

The other major dimension in this framework is task complexity which is defined as “the intrinsic cognitive demands of the task which can be manipulated during task design” (Robinson, 2003, p. 55). These processing demands are imposed by the structure of the tasks on the learners (Robinson, 2001a); therefore, through empirical investigation, it is possible to determine the specific structure of the tasks and predict their potential effect on the learners’ performance beforehand. This dimension is an intra-learner variable. Robinson (2001a, 2001b, 2005) predicts increasing the complexity along the Resource-directing variables would bring about less fluency and great complexity and accuracy, i.e., -fluency, +accuracy, +complexity since these dimensions would direct learners’ attentional and memory resources to L2 system in order to understand and convey the functional complexity, as a result, their attention to L2 grammaticisation (i.e., accuracy and complexity) in those conceptual domains would increase (Robinson, 2007b) to the detriment of fluency. On the other hand, tasks manipulated along the resource-dispersing dimensions do not “direct learners to any particular aspects of language code” (Robinson, 2005, p. 22) and would give rise to less fluency, accuracy, and complexity, i.e., -fluency, -accuracy, -complexity.
Studies on Cognitive Task Complexity

Various studies have been conducted to examine the different dimensions of task complexity. Investigating the role of +/-planning dimension (i.e., the amount of planning time allowed), Ellis (1987) observed that the less the planning time, the less accurately past tense, the regular past, the irregular past, and the copula were utilized. Inspecting the role of planning (pre-task and on-line planning) on L2 oral performance, Yuan and Ellis (2003) formed three groups: 1) group with no pre-task planning time, 2) group with 10 minutes planning time, and 3) group with no pre-task planning time but ‘on-line’ planning time. The on-line planning time group generated greater structural complexity and more error-free clauses. Structural complexity and generated greater structural complexity and more error-free clauses. Structural complexity and lexical complexity of the group with pre-task planning augmented. No significant effect was found for accuracy measures. It seemed that the available time before the task directed the participants’ attention towards the fluency and meaning conveyance, while the time available during the task provided opportunities for them to call their attention towards accuracy and monitoring their output.

Focusing on testing situations, Tavakoli and Skehan (2005) designed a study in which a four-degree task structure was utilized. Two planning conditions were used: no planning and 5 minute planning. Two proficiency levels were investigated: elementary and intermediate levels. The participants in the planning group yielded more fluent, more accurate, and more complex language. The performance of the participants in the intermediate groups was more complex and more error-free. Based on the findings, the effect of the planning time was significant for fluency.

Rouhi and Marefat (2006) conducted a study to investigate the role of planning dimension on thirty seven Iranian EFL learners’ written and oral performance. They devised three tasks: 1) no planning time and oral production, 2) planning time and oral production, and 3) on-line planning and written production. It was found that in comparison with group 1, the fluency and accuracy of group 2 and 3 significantly improved. However, no group gained more on the measures of complexity measures. They also
declared that both planning time and modality exerted significant effect on fluency and accuracy but not on complexity.

Robinson (1995b) designed a study to investigate the role of manipulating task complexity along +/- Here-and-Now aspects (i.e., “the degree of displaced past time reference” [Gilabert, 2004, p. 84]) on the L2 oral narrative performance of learners. The participants of his study generated more accurate, more lexically complex, and less fluent language in the most complex task.

Gilabert (2007) explored the effect of +/- planning time and +/- Here-and-Now dimensions on oral narratives via using four strips. Based on the findings, in terms of +/- Here-and-Now dimensions, higher accuracy, less lexical complexity, less fluency was observed for - Here-and-Now dimensions. Planning opportunity was found to improve the fluency, lexical complexity, and accuracy of the production. However, no significant effect was reported for the measures of structural complexity.

Investigating the impact of immediacy (+/- Here-and-Now dimension) and pre-task planning time, Farahani and Meraji (2011) devised four conditions: 1) Here-and-Now with no pre-planning time, 2) Here-and-Now with 14 minutes as pre-planning time, 3) There-and-Then with no pre-planning time, and 4) There-and-Then with 14 minutes as pre-planning time. One hundred and twenty Iranian learners were served as the participants of this study. Their written performance was coded based on the measures of fluency, accuracy, and complexity. The results indicate that the groups with planning time increased their grammatical accuracy and generated more structurally complex language. In +/-Here-and-Now groups, no significant effect of accuracy and structural complexity was found. The manipulation of both dimensions (planning and immediacy) led to no significant difference in the lexical complexity of their written performance, but brought about greater fluency.

In their study, Salimi, Dadashpour, and Asadollahfam (2011) focused on the resource-directing factors on 29 learners’ written performance in terms of accuracy, fluency, and complexity. Accuracy was quantified by the number of error-free T-units per T-units, fluency by number of words per T-units, and complexity by a measure of S-nodes per T-units. The results
indicated that the accuracy of the participants’ performance was not significantly changed from the simple to the complex tasks. Manipulating task complexity had a significant positive effect on the fluency and the complexity of their production.

RimaniNikou and Eskandarsefat (2012) designed a study to delve into the effect of both task complexity and task type. They utilized two types of tasks: decision-making and information-gap. Sixty Iranian EFL learners were asked to accomplish simple decision making and information gap tasks and complex decision making and information gap tasks with the interval of two weeks. They reported significant effects of task complexity just on accuracy and fluency but not on syntactic complexity. Regarding information-gap tasks, the learners significantly produced more error-free clauses and greater number of words. The results also indicated that just fluency significantly differs in the two task types.

Abdollahzadeh and Fard Kashani (2012) investigated the role of +/- Here-and-Now dimension on the written narrative performance with different language proficiency levels. They found that both manipulating task complexity and considering proficiency levels had significant positive effect on the accuracy and complexity of the participants’ production, meaning that the complex task triggered high-proficient learners to generate significantly more complex and accurate language. No significant effect was found for fluency.

Sotoudehnama and Farahanyinia (2014) explored the role of cognitive task complexity across writing proficiency levels. Based on the scores of the writing test of TOEFL (2004), the participants were divided into two groups: high- proficient and low-proficient writers. They declared that language proficiency levels may be different from writing proficiency levels (Cooper, 1984), and since in their study, they focused on the written performance of the participants, they chose to focus on writing proficiency levels. Two groups performed the simple task (i.e. narrating a set of pictures) and the complex task (i.e., writing about an argumentative topic) with the interval of one week. Their written performance was coded based on the measures of accuracy, fluency, and complexity taken from Larsen-freeman (2006). The results indicated that the complex task primed learner to produce less error
free clauses, more structurally complex language, and more number of words. No significant interaction between task complexity and writing proficiency was found. They claimed that Skehan’s predictions turned out to be more accurate in the Iranian context.

As is clear, some of the elements in Robinson’s (2005, 2007) framework have been investigated to a great extent, such as +/- planning dimension (e.g., Ellis & Yuan, 2004; Foster & Skehan, 1996, 1999; Mehnert, 1998; Skehan & Foster, 1997; Wigglesworth, 2001; Yuan & Ellis, 2003) and +/-Here-and-Now dimension (Berwick, 1993; Ishikawa, 2007; Masrom, Daud, & Alwi, 2015; Mehrinejad, and Aliasin, 2015; Rahimpour, 2007; Skehan & Foster, 1999) or even their synergistic effect (Farahani & Meraji, 2011; Iwashita, Elder, & McNamara 2001). However, one of the dimensions under the resource-depleting feature, namely +/-single task (i.e., the number of tasks that have to be performed simultaneously), has been somehow unnoticed. The effect of task complexity on oral language production has caught many researchers’ attention in the past twenty years, there is considerably less research on how different complexity levels of task influence written output of FL learners.

**Method**

**Design of the Study**

In the current study, a pretest (Writing Proficiency section of TOEFL) was used and the participants were randomly assigned to two groups; however, since there was no control group, this study had an experimental comparison group design (a between-subject design). The main independent variable was task complexity with two levels (simple task vs. complex task), and the dependent variable was dimension of language production, namely, lexical complexity.

**Participants**

Initially, the homogeneity of the participants’ writing proficiency was checked. To this end, the writing section of the TOEFL (2004) was administered to the Iranian EFL learners (n = 72) as a pre-writing test. Their written performance was rated based on Jacobs et al.’s (1981) scoring
profile (Appendix B), which consists of five sub-parts, including content, vocabulary, language, organization, and mechanics (as cited in Weigle, 2002) by two skillful teachers. Based on the results, those participants whose scores were between one SD above and below the mean (i.e., between 66.15 and 75.71) (n = 48) were deemed to be roughly at the same level of writing proficiency and took part in this study as the main participants.

The participants of this study were Iranian EFL learners studying at Ayandegra Institute, in Zanjan. They were both males and females, aged between 16 and 25. The participants were chosen from the learners who had been placed at the upper-intermediate level based on the institute’s placement test. While the data were being gathered, they studied Summit 1A book and attended their English classes three times a week.

Seventy two Iranian learners took Writing Proficiency section of TOEFL (Educational Teaching Service, 2004). The scores of 48 students were placed within one standard deviation below and above the mean (+/-1 SD), later on, were considered to be roughly at the same writing proficiency level and participated in this study. These selected participants were assigned to two groups, namely, simple task group (STG) (n = 24) and complex task group (CTG) (n = 24).

Instruments

Three instruments were used in this study. The Test of English as a Foreign Language (TOEFL, EST, 2004), as a renowned standardized language proficiency test, was the first instrument utilized at the beginning of the study to check the homogeneity of the participants’ writing proficiency level.

The content validity of the test was confirmed using an expert panel’s unanimous agreement and its reliability approved with Cronbach's alpha STG = .93 and CTG = .88.

However, just the writing section was used, since in this study the researchers’ focus was on the writing ability of the students. As Cooper (1984) argued, if the purpose is to explore the learners’ writing abilities, it is required to focus on this skill exclusively, and general proficiency tests are
not good indicators of this skill since they are more concerned with recognition and comprehension than production (Skehan, 1998, p. 15).

In this pretest, the participants were asked to write about the following topic in 35 minutes.

Do you agree or disagree with the following statement? Use reasons and examples to support your opinion.

“Universities should give the same amount of money to their students’ sports activities as they give to their university libraries”

The next instrument was a narrative task- an eight-frame picture (Appendix A), taken from Yule (1997). It was used in both the simple and complex narrative tasks but in different manners. Narrating stories are tasks “supported by visual material, but which require some degree of organization of material to tell a story effectively” (Skehan & Foster, 1999, p. 98). The task used in this study was a one-way task with no interaction among the participants (Ellis, 2003), and consisted of “a clear time line, a script, a story with a conventional beginning, middle, and end” (Tavakoli & Skehan, 2005, p. 246).

The learners were asked to narrate the picture using at least 150 words. The picture set was available for them at the time of performing the task.

The story was as follows: a woman goes to a supermarket. In the supermarket, she runs into her friend who was shopping with her little son. She starts talking with her. They get so engrossed in talking that they overlook the child. The child is very naughty. He stretches out his hand, takes a bottle, and puts it in the other woman's bag. Two women say goodbye and separate.

The scoring profile (Appendix A) devised by Jacobs, Zinkgraf, Wormuth, Hartfeil, and Hughey’s (1981, cited in Weigle, 2002). It was used to score the participants’ written output in the pretest. This scoring profile lays emphasis on “the distinguishing characteristic of communicative language use – interaction between the language user, the context, and the discourse” (Bachman, 1990, p. 302). It is comprised of five components including content, vocabulary, language, organization, and mechanics. According to the profile, the score ranges from 34 to 100.
Procedure

At first, they were randomly assigned to two groups: simple-task Group (STG) (n = 24) and complex-task Group (CTG) (n = 24). The participants in the STG were given the whole picture (Appendix A). The frames of this picture had been arranged in the correct sequence before its administration to the participants of this group (+single task). The participants in the CTG were given all the frames of the picture; however, the frames were not arranged in their correct order; therefore, these participants were first asked to order the frames in the right sequence, and then to start writing about it (-single task = double task).

The participants in both groups were asked to write a story of at least 150 words based on the picture. In both groups, the participants could see the pictures while writing about it (+Here-and-Now dimension). The picture was administered by their normal teacher, and he or she did not give any special guidance with respect to formal features, organizational points, or the content.

Results

The main independent variable of this study was task complexity with two levels (simple task vs. complex task), and the dependent variable was lexical complexity. The measures used in this study to encode the production dimensions were taken from Larsen-Freeman (2006, p. 597) and was as follows: “word types per square root of two times the words” for lexical complexity. In order to reject or maintain nullifying or verifying the null hypothesis, independent sample t-test was conducted. However, before that, sample Kolmogorov-Smirnov test and Shapiro-Wilk test were run to check the normality of the data statistically. The results are shown in Table 1.

Our research question dealt with the possible effect of employing the simple and complex tasks on the lexical complexity. Lexical complexity was calculated by “word types per square root of two times the words” (Larsen-Freeman, 2006, p. 597). Figure 1 and Figure 2 demonstrate the histograms and box plots of the data obtained in the STG and CTG in terms of lexical complexity.
The Impact of Task Complexity

Figure 1. Histograms of the participants’ production in the simple task (A) and the complex task (B) in terms of lexical complexity

Figure 2. Box plots of the participants’ production in the simple task (A) and the complex task (B) in terms of lexical complexity

Visually, Figure 1 and Figure 2 demonstrate the normality of the data. Table 1 reported the results of one-sample Kolmogorov-Smirnov tests and Shapiro-Wilk test for the data obtained for lexical complexity.

Table 2
One-sample Kolmogorov-Smirnov Tests and Shapiro-Wilk Tests of the Participants’ Performance on Lexical Complexity

<table>
<thead>
<tr>
<th></th>
<th>Kolmogorov-Smirnov Statistic</th>
<th>N</th>
<th>Sig.</th>
<th>Shapiro-Wilk Statistic</th>
<th>N</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC.STG</td>
<td>.173</td>
<td>24</td>
<td>.062</td>
<td>.963</td>
<td>24</td>
<td>.503</td>
</tr>
<tr>
<td>LC.CTG</td>
<td>.119</td>
<td>24</td>
<td>.200*</td>
<td>.955</td>
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<td>.349</td>
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</tbody>
</table>
As seen in Table 2, statistically speaking, the data was normally distributed since all the levels of significance were more than .05.

Table 3 reports descriptive statistics for the participants’ performance in terms of lexical complexity.

### Table 3

**Participants’ Performance in Terms of Lexical Complexity**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC.STG</td>
<td>24</td>
<td>3.32</td>
<td>5.42</td>
<td>4.2596</td>
<td>.54650</td>
<td>.299</td>
</tr>
<tr>
<td>LC.CTG</td>
<td>24</td>
<td>4.08</td>
<td>6.04</td>
<td>5.0456</td>
<td>.56777</td>
<td>.322</td>
</tr>
<tr>
<td>Valid N (list wise)</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As seen in Table 3, the mean and standard deviation of the data obtained from the simple task group were 4.25 and .54, respectively.

The mean and standard deviation of the data obtained from the complex task group were 5.04 and .56, respectively. In order to see whether this difference was statistically significant or not, one independent samples t-test independent was run.

### Table 4

**Independent Samples t-test for Task Complexity along Lexical Complexity**

<table>
<thead>
<tr>
<th>Levene's Test for Equality of Variances</th>
<th>F</th>
<th>Sig.</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>Std. Error Difference</th>
<th>95% Confidence Interval of the Difference</th>
<th>df</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC - Equal variances assumed</td>
<td>.543</td>
<td>.46</td>
<td>-3.2</td>
<td>46</td>
<td>.002</td>
<td>-.55017</td>
<td>.17128</td>
<td>-.8949 to -.205</td>
<td>.46</td>
<td>-.8950</td>
<td>-.205</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td></td>
<td></td>
<td>-3.2</td>
<td>45.6</td>
<td>.002</td>
<td>-.55017</td>
<td>.17128</td>
<td>-.8949 to -.205</td>
<td>.46</td>
<td>-.8950</td>
<td>-.205</td>
</tr>
</tbody>
</table>

Table 4 indicates that the variance of the groups is equal; therefore, the first line must be reported, i.e., t (46) = -3.212, p < 0.05. Since the level of significance is less than .05, it can be stated that the difference between the means of the STG and CTG in terms of lexical complexity was statistically significant. Hence, based on the results, our null hypothesis was nullified.
Discussion

The dependent variable of the question was lexical complexity which was calculated by “word types per square root of two times the words” (Larsen-Freeman, 2006, p. 597). This measure is not sensitive to the length of the output; therefore, it is considered to be a better measure. It seems that the participants could produce greater types of words in the complex task, and -single task could have a significant effect on lexical complexity.

Regarding the results of the present study, it can be stated that when the participants were engaged putting the pictures in their correct order in the complex task, they carried out deeper semantic processing in order to find the reasonable order, which might lead to the better activation of their exemplar-based system and made them browse it more deeply. The effort to grasp the meaning propelled the learners to construct larger chunks of information (Attarzade, & Farahani, 2014; Ishikawa, 2007). This brought about the retrieval of a greater number of words from this system at the time of task for the lexical complexity of the output.

It is also explicable through Levelt’s (1989) production stages. Maybe the participants, while ordering the frames of the picture, activated more items at the conceptualization phase in the process of figuring out the connection among the frames. This gave them a broader scope containing more types of words. At the formulation stage, the fast retrieval of those items also provided them with greater time to think of and retrieve even more types of words.

This finding is in line with the results reported in Berwick’s (1993), Robinson’s (1995b), and Yuan and Ellis’ (2003) studies. They found that the participants generated greater number of words in the most complex task. Robinson (1995b) attributed this finding to the more cognitive load of the task, which gave rise to the retrieval of more items from the memory. Ishikawa’s (2007) study revealed the use of less lexical variety in the simple task by the participants. Ishikawa (2007) declared that in the complex task (the there-and-then condition), the role of memory was more conspicuous since the participants had to keep the story in their mind and retrieve it in the near future. This cognitive load made them to perform greater semantic processing, which led to greater lexical complexity.
Some other studies revealed different results. Mehnert (1998) found that the more time was available before the task, the more lexically complex their output became; in other words, the easier the task was, the probability of producing more complex language reduced. Yuan and Ellis (2003) also reported less lexical complexity for the group with pre-task planning. Ellis and Yuan (2004), Ortega (1999), and Rahimpour (2007) all observed the production of less lexical variety in the more complex task, and attributed this finding to the increased pragmatic demands of the complex task.

Some studies observed no significant improvement or regression in the lexical complexity of the learners’ output from the simple to complex tasks. Ellis and Yuan (2004) believe that in both the simple and complex tasks, the participants had the same amount of time to focus on this dimension, since “in the written task all learners had sufficient time for lexical searching and prioritized this aspect of verbal processing” (Ellis & Yuan, 2004, p. 80); so no significance results were found. Farahani and Meraji (2011), Jiaxin (2015), and Sotoudehnam and Farahanynia (2014) attributed this finding to the learners’ proficiency level and English ability and declared that maybe their participants did not possess enough breadth of vocabulary knowledge.

Skehan and Foster (1999) argued that one of the reasons of such mixing results might be the application of various types of tasks. In the same vein, Ortega (1999) ascribed it to different types of methodologies utilized by different researchers.

On the whole, the null hypothesis dealt with the impact of task complexity on the lexical complexity. This null hypothesis was nullified since the results indicated positive significant impact of +/- single dimension on lexical complexity. In other words, the use of the double task gave rise to the improvement of lexical complexity.

Conclusion

The purpose of the current study was to determine the recent research into the task complexity on Iranian EFL learners’ L2 lexical complexity. Our findings showed that the provision of task complexity along +/-single task dimension significantly affected Iranian EFL learners’ written performance qualitatively and quantitatively. The following conclusions can
be drawn from the present study: Regarding the quantitative aspect, this
dimension led to greater fluency gains, and in terms of qualitative aspects,
both lexical and syntactic complexity increased due to the manipulation of
task complexity. However, the measure of accuracy decreased through the
use of a more complex task. The results indicated positive significant impact
of +/- single dimension on lexical complexity. In other words, the use of the
double task gave rise to the improvement of lexical complexity. It can be
stated that when the participants were engaged putting the pictures in their
correct order in the complex task, they carried out deeper semantic
processing in order to find the reasonable order, which might lead to the
better activation of their exemplar-based system and made them browse it
more deeply.

Regarding theatrical implications, the findings of the present study run
counter with the predictions of cognition hypothesis (Robinson, 2005, 2007)
and were in line with the limited attentional capacity model
(Mohammadzadeh, Dabaghi & Tavakoli, 2013; Skehan, 1996, 1998; Skehan
& Foster, 1999; van Patten, 1990), even when a resource-dispersing feature
in Robinson’s triadic framework is used.

Concerning pedagogical implications, the findings of this study can
shed light on the selection and gradation of the tasks in TBLT syllabi. It
shows via the manipulation of different degrees of the task complexity, the
teachers can selectively direct learners’ attention towards the production
dimension in which the learners have problems.

Although many task-based studies have been undertaken so far, there
are still numerous baffling challenges waiting to be solved via future
research. Regarding task complexity, a longitudinal research can be
conducted in order to explore the ability of the learners in transferring their
enhanced ability due to the task manipulation to other contexts and tasks. In
order to gain rich description, post-task interviews, questionnaires,
retrospective and introspective measures can also be utilized. Future
research can evolve around other types of tasks being manipulated along
different task features. Even individual differences regarding the learners’
learning style, learning strategies can also be taken into account in future
research.
References


The Impact of Task Complexity  


Appendix A

Prompt for the simple writing task, taken from Yule (1997)

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

Jacobs, Zinkgraf, Wormuth, Hartfeil, and Hughey’s (1981) scoring profile

<table>
<thead>
<tr>
<th>SCORE</th>
<th>CONTENT</th>
<th>DATE</th>
<th>TOPIC</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-27</td>
<td>EXCELLENT TO VERY GOOD: knowledgeable • substantive • thorough development of thesis • relevant to assigned topic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26-29</td>
<td>GOOD TO AVERAGE: some knowledge of subject • adequate range • limited development of thesis • mostly relevant to topic, but lacks detail</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-17</td>
<td>FAIR TO POOR: limited knowledge of subject • little substance • inadequate development of topic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-13</td>
<td>VERY POOR: does not show knowledge of subject • non-substantive • not pertinent • OR not enough to evaluate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-18</td>
<td>EXCELLENT TO VERY GOOD: fluent expression • ideas clearly stated/supported • succinct • well-organized • logical sequencing • cohesive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-14</td>
<td>GOOD TO AVERAGE: somewhat choppy • loosely organized but main ideas stand out • limited support • logical but incomplete sequencing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-10</td>
<td>FAIR TO POOR: non-fluent • ideas confused or disconnected • lacks logical sequencing and development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-7</td>
<td>VERY POOR: does not communicate • no organization • OR not enough to evaluate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-18</td>
<td>EXCELLENT TO VERY GOOD: sophisticated range • effective word/idiom choice and usage • word form mastery • appropriate register</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-14</td>
<td>GOOD TO AVERAGE: adequate range • occasional errors of word/idiom form, choice, usage but meaning not obscured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-10</td>
<td>FAIR TO POOR: limited range • frequent errors of word/idiom form, choice, usage • meaning confused or obscured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-7</td>
<td>VERY POOR: essentially translation • little knowledge of English vocabulary, idioms, word form • OR not enough to evaluate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-22</td>
<td>EXCELLENT TO VERY GOOD: effective complex constructions • few errors of agreement, tense, number, word order/function, articles, pronouns, prepositions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-18</td>
<td>GOOD TO AVERAGE: effective but simple constructions • minor problems in complex constructions • several errors of agreement, tense, number, word order/function, articles, pronouns, prepositions but meaning seldom obscured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-11</td>
<td>FAIR TO POOR: major problems in simple/complex constructions • frequent errors of negation, agreement, tense, number, word order/function, articles, pronouns, prepositions and/or fragments, run-ons, deviations • meaning confused or obscured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-5</td>
<td>VERY POOR: virtually no mastery of sentence construction rules • dominated by errors • does not communicate • OR not enough to evaluate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>EXCELLENT TO VERY GOOD: demonstrates mastery of conventions • few errors of spelling, punctuation, capitalization, paragraphing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>GOOD TO AVERAGE: occasional errors of spelling, punctuation, capitalization, paragraphing but meaning not obscured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>FAIR TO POOR: frequent errors of spelling, punctuation, capitalization, paragraphing • poor handwriting • meaning confused or obscured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>VERY POOR: no mastery of conventions • dominated by errors of spelling, punctuation, capitalization, paragraphing • handwriting illegible • OR not enough to evaluate</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TOTAL SCORE</th>
<th>READER</th>
<th>COMMENTS</th>
</tr>
</thead>
</table>

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