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The Effects of Task Complexity on EFL Learners' Production: Focusing on Complexity

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Abstract: *The language learning process demands the combination and integration of factors that contribute to achievement. The context of learning necessitates specific prerequisites that make this process more effective for both learners and language practitioners. Apart from contextual and extra-curricular factors, some in-text and language-related factors might be problematic, making the process more complex. Language complexity is said to be connected to task complexity, which is a crucial element of task-based language instruction. It implies that a task's degree of complexity can be correlated with the language required to do it. This study looked into how task complexity affected the complexity aspect of L2 learners' written performance. For this study, 25 Iranian foreign language learners were chosen as participants. To conduct the tasks, they were required to complete three different kinds of cognitive tasks: (1) here-and-now; (2) reasoning demand; and (3) +/- a few items. There were two ways to do each task: simple and complicated. Syntactic complexity of the participants' output was tested and coded. The examination of the complexity measures revealed that complicated activities have a more complex output structure than simple tasks, although there was no discernible difference in syntactic complexity across the individuals.*

Keywords: Cognitive Tasks, CLT, EFL, Language Teaching, Linguistic Complexity, L2 Learners, TBLI

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1. Introduction

Taking into consideration that tasks form the basis of the language curriculum and structure, task-based language instruction is regarded as the most effective kind of communicative language instruction (Ellis, 2003:30). In task-based language instruction, grammatical structures are considered either in the post-stage as part of the focus on form or through the meaningful use of language in everyday tasks (Robinson, 2001). Task-based language education engages students in communicative language skill manipulation by emphasizing all four language skills. The impact of task complexity on other elements like accuracy, fluency, and complexity is one of the main concerns in the topic of task-based language instruction. Depending on the unique characteristics each participant brings to the activity, these consequences may vary.

Because tasks are the fundamental component of planning and instruction, task-based language instruction (TBLI) is widely recognized as one of the most influential and successful approaches within communicative language teaching (Ellis, 2003, p. 30). TBLI arranges learning around meaningful tasks that require students to use language to accomplish particular communicative goals, in contrast to traditional structure-based systems that arrange curricula around grammatical objects. According to this concept, language is seen as a tool for communication rather than just a system of forms that must be learned. As a result, education emphasizes meaning-focused engagement while making room for linguistic form.

Ellis (2003, pp.30) asserts that task-based language instruction was not a cohesive strategy. The use of tasks in language instruction can be approached in a variety of ways. In accordance with Robinson (2001, 2005) and Skehan and Foster (1997, 1999, & 2001), we concentrate on the cognitive approach as one of the various TBLT approaches. Cognitive methods in task-based research, according to Robinson (2001, pp. 31), concentrate on how variations in a task's cognitive demands impact the performance of second language (L2) learners. Task complexity is defined as "the host of cognitive factors which is the result of attentional, memory, reasoning, and other information processing demands imposed by the structure of the task on the language learner," according to Robinson (1995, p.29). Robinson separates task complexity variables into two categories based on the notion of cognitive hypothesis: 1) resource-directing and 2) resource-dispersing.

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The concept of task complexity is fundamental to this viewpoint. Task complexity is described as "the host of cognitive factors which result from the attentional, memory, reasoning, and other information-processing demands imposed by the task structure on the language learner" Robinson, 1995, p. 29). In this sense, task complexity is not merely a surface feature of a task but reflects the underlying cognitive operations required to complete it. Tasks may differ in the degree to which they require learners to recall information, reason about cause and effect, consider multiple perspectives, or process information simultaneously. The allocation of attentional resources during task execution is influenced by these cognitive demands.

Robinson distinguishes between two main categories of task complexity variables: resource-directing and resource-dispersing factors, building on what he later defined as the Cognition Hypothesis. Because they raise conceptual and reasoning challenges, resource-directing variables encourage learners to focus on particular linguistic forms. Tasks that call for references to hypothetical scenarios, historical events, or causal explanations, for instance, may draw attention to certain linguistic structures like subordination or tense marking. Robinson claims that by focusing learners' attention on form-meaning mappings, increasing resource-directing complexity can foster higher linguistic complexity and correctness.

Resource-dispersing variables, on the other hand, raise processing demands overall without necessarily focusing attention on particular language forms. These include things like not having enough time for planning, having to do several things at once, or having to deal with new information. The limited attentional capacity of learners may be overloaded by such variables, which could result in trade-offs between accuracy, fluency, and complexity. Learners may favor meaning over form when cognitive resources are divided among conflicting demands, which could lead to decreased accuracy or structural complexity.

By "resource-directing dimension," he means that students must employ increasingly intricate and sophisticated frameworks. He thinks that while students' attention is drawn to the language's linguistic features when cognitive demands are raised, L2 learners are compelled to alter their production. Conversely, resource-distributing tasks force students to shift their focus from linguistic forms to various task requirements. As a result, participants are unable to concentrate on all of the complex elements by using all of the available resources. The resource-dispersing dimension has (+/- planning time, +/- prior knowledge, and +/- single task) variables, while the resource-directing dimension has (+/- few elements, +/- reasoning demand, and +/- here and now), according to Robinson's cognition hypothesis model (multiple attentional resource model).

The goal of the current study is to methodically investigate how task complexity affects the written output of second language (L2) learners, with a focus on essay writing. The study aims to explore how differences in the cognitive demands of writing tasks affect the linguistic features of learners' essays. It is based on the cognitive approach to task-based language teaching (TBLT). It specifically investigates how three key aspects of L2 performance—accuracy, fluency, and linguistic complexity—are impacted by increased task complexity.

This study attempts to ascertain whether increased cognitive demands encourage greater syntactic and lexical sophistication in written output, based on Robinson's Cognition Hypothesis, which suggests that cognitively complex tasks may direct learners' attention toward more elaborate form–meaning mappings. The study aims to add to the current theoretical and empirical discussion about how task design influences L2 development by examining essays written under tasks that have been altered for cognitive complexity. In order to promote balanced language development, it also aims to offer pedagogical insights on how task sequencing and complexity calibration may be optimized in writing teaching. The ultimate goal of this research is to improve knowledge of the cognitive processes that underlie L2 written performance and to guide evidence-based strategies in task-based language instruction. This study aims to investigate the complexity factor and its effect on the performance of the students' written essays.

RQ: Does task complexity affect the syntactic complexity of Iranian EFL learners' essays?

2. Materials and Methods

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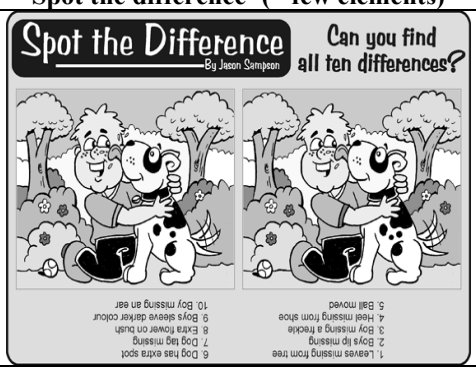
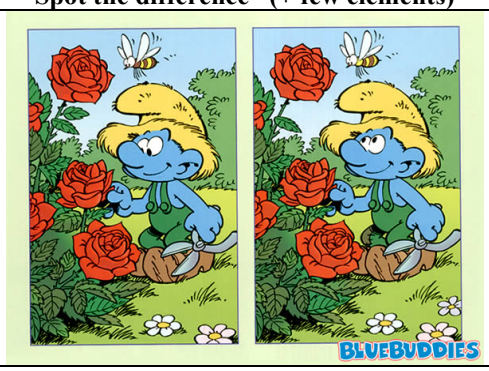
Twenty-five Iranian women who were learning English as a foreign language (EFL) participated in this study. At the time of data collection, students were engaged in regular English language lessons at Andishe Sabze Ehsan Language Institute in Urmia, Iran, where they were recruited. Because Azeri (Azerbaijani Turkish) was the first language spoken by all participants, there was a degree of linguistic uniformity.

The participants, who represented teenage and young adult learners, ranged in age from 15 to 30. Due to institutional and contextual limitations, the sample was restricted to female students; however, this homogeneity decreased possible variability attributable to gender-related differences in language performance. All students fulfilled the necessary tasks as part of the research process, and participation in the study was entirely optional.

Six picture-based narrative tasks were chosen as elicitation tools to gather data for the current study. These visual cues were created to produce textual results at different task complexity levels. Two "spot-the-difference" picture pairs were selected to vary the first task complexity variable (± a few elements). While the other pair had more differences (+ few items condition), which increased the processing load needed to find, compare, and describe discrepancies, the first pair had fewer different elements (– few items condition), which imposed lower cognitive and attentional demands. By altering the quantity of information students had to analyze and encode in their written narratives, this manipulation aimed to operationalize task difficulty. The study sought to investigate how variations in cognitive demand affect the linguistic features of learners' writings, namely in terms of accuracy, fluency, and complexity, by methodically regulating the quantity of visual components. Picture stories were selected to gather data for the study that follows. For the first variable (+/- a few items), two spot-the-difference images were chosen.

<table>
<tr><th>Spot the difference [1](– few elements)</th><th>Spot the difference [2] (+ few elements)</th></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td colspan="2">Two descriptive pictures were selected according to the second variable (+/- reasoning demand). descriptive picture [1](– reasoning demand) and descriptive picture [2] (+ reasoning demand)</td></tr>
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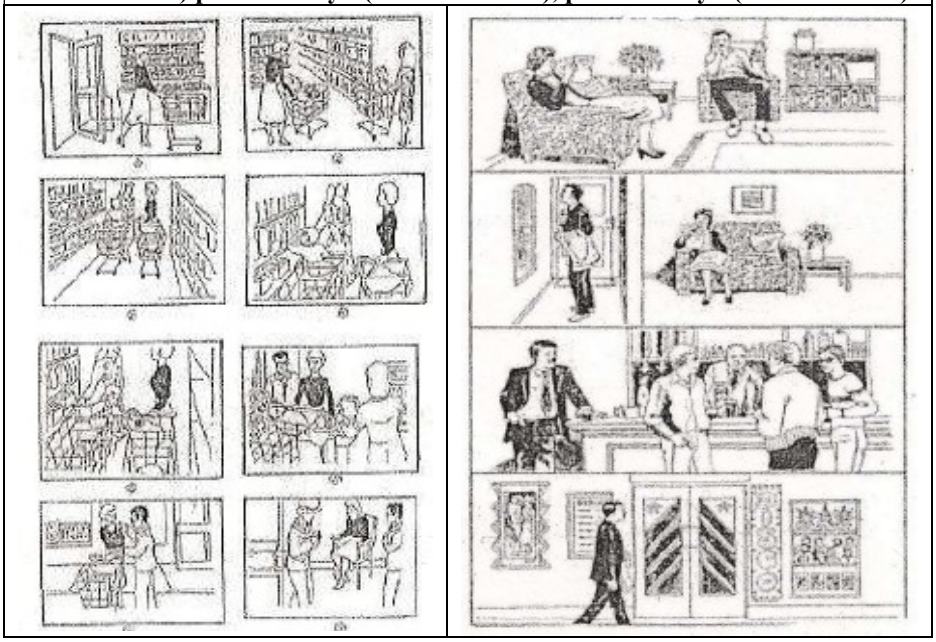
The last two picture stories were chosen according to the third variable (+/- here and now) picture story [1] (there-and-then), picture story [2] (here-and-now)



Using objective measurement standards, the degree of complexity in the participants' essays was evaluated. Certain structural markers were used to provide a methodical and measurable assessment of language difficulty. By generating ratios based on the link between the overall amount/number of words and specific grammatical elements within the texts, complexity was operationalized. In particular, the total number of words generated in each essay was divided by the number of coordinating conjunctions and error-free terms found in each phrase. These computations made it possible to produce numerical indices that represented the participants' written output's grammatical and structural complexity. A standardized grading rubric and objective measurement criteria were used to evaluate the degree of complexity of the essays authored by research participants. During the written text analysis, several structural indicators were used to provide a methodical and uniform assessment of linguistic complexity. The rubric promoted reliability and decreased subjective interpretation in the evaluation process by offering precise descriptors and scoring standards for assessing the participants' written production's accuracy and complexity.

Students were informed before the experiment that the tasks they would be completing were only linked to research and would not have an impact on their academic achievement. Later on, they were given more clues regarding the overall procedure for doing the work. They were told to finish both the basic and advanced versions of each task. They were told to start by filling out the simple form. Based on the topic of each assignment, they received three different photos and an essay writing prompt. All of the tasks' basic forms had text support, but their more complex versions did not.

To further operationalize linguistic complexity, quantitative measurements were employed in addition to rubric-based evaluation. In particular, the total number of words generated in each essay was computed and then divided by the number of coordinating conjunctions and error-free words found in each phrase. These computations produced numerical indices that represented the participants' writing's grammatical correctness and structural complexity. In order to give a thorough and trustworthy assessment of the participants' essay complexity, the study combined objective quantitative measurements with a rubric-based assessment.

They completed the first task based on the first variable (+/- a few components) within the first session. Two distinct locations with distinct images were chosen. These images consist of two similar images with a few different objects in between. They had to locate four distinct objects among themselves to complete the easy

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task. However, they were expected to identify every distinction between them in a complex form. They completed the second task in the second session based on the second variable (+/- reasoning requirement). To perform the complex task, they saw a picture of a man and were asked to guess who he would choose as his best choice. Then, they were supposed to give an acceptable reason to support their claims.

They completed the there-and-then and here-and-now exercises in the third session. To complete the here-and-now task, pupils were first given a pictorial tale. They had to use the simple present tense when writing their descriptions. Afterwards, students were given another visual tale to complete the there-and-then exercise, and they were instructed to write their descriptions in the simple past tense. Lastly, based on the production metrics, the written essays were gathered and assessed for accuracy and complexity.

3. Results

The box plots of the scores show that there were neither signs of extreme cases nor of extremely skewed distributions. The following table shows the descriptive statistics for accuracy scores.

The ANOVA findings for the within-subjects factors of tasks with two levels of complexity (complicated and simple) and three types (picture story, detect the difference, and reasoning demand) are displayed in Table 2. The table's findings can be summed up as follows. With a p-value of less than 0.05, the factor tasks—picture story, notice the difference, and reasoning demand—were significant. Put differently, $F(2, 48) = 16.15$; $P < 0.05$. Given that the p-value for F was less than 0.05 ($F(1, 24) = 15.99$; $p < 0.05$), the factor complexity (simple and complicated) was significant. Given that its p-value was more than 0.05, the task*complexity interaction was not significant. That is, $p > 0.05$; $F(2, 48) = 0.07$. Consequently, task and complexity had a substantial main influence on accuracy, but there was no significant interaction between the two groups. To put it another way, the type of assignment and its complexity both affect writing accuracy. This indicates that individuals were able to use more complicated structures when given increasingly challenging tasks accurately.

A two-factor within-subjects ANOVA was performed to examine the relationship between task complexity and production complexity. The data had to be examined for anomalies and outliers before running the ANOVA test. Consequently, the complexity scores were examined in the box plots.

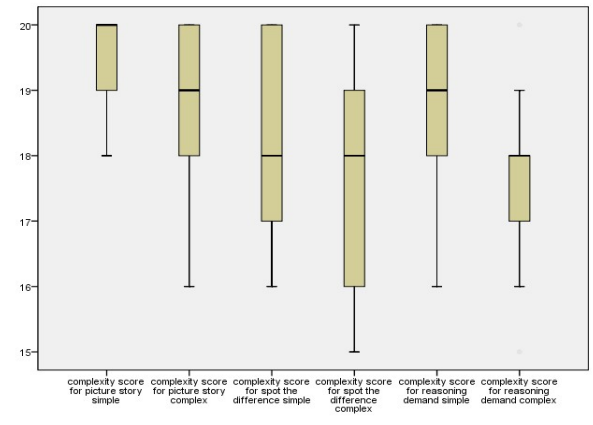

Figure 1: Box plots for the complexity scores

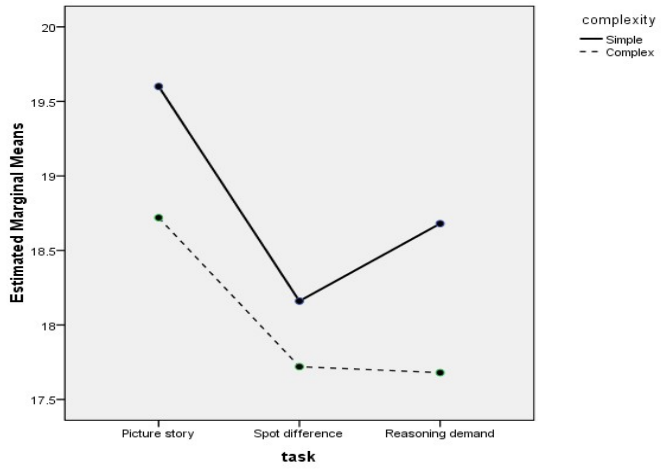

Figure 2: Profile plots for the complexity

According to Figure 1, there are no extreme values related to complexity scores.

Table 1: Descriptive statistics for complexity

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	Mean	St.deviation	N
Complexity scores picture simple	19.60	.58	25
Complexity scores picture complex	18.72	1.31	25
Complexity spot the difference simple	18.16	1.43	25
Complexity spot the difference complex	17.72	1.70	25
Complexity score reasoning demand,(s)	18.68	1.28	25
Complexity score reasoning demand,(c)	17.68	1.52	25

Table 2: Tests of within-subjects effects for complexity

Source	Type III sum of squares	df	mean squares	F	sig
Task	41.77	2	20.89	12.60	.00
Error, task	79.56	48	1.66		
Complexity	22.43	1	22.43	14.20	
Error (C)	37.91	24	1.58		
Task (C)	2.17	2	1.09	.53.59	
Error (TC)	98.49	48	2.05		

The findings of the descriptive statistics for the complexity scores are displayed in the above table. Picture stories (19.60 for simple and 18.72 for complex), simple reasoning demands (18.68), and simple identifying the difference (18.16) get the greatest mean complexity scores. The image story assignment was the easiest for the participants to complete, followed by the descriptive picture task and the notice the difference task. Even while they excelled at the picture narrative assignment in the more difficult version of the task, their performances in the spot the difference and reasoning demand tasks were very similar.

Since the p-value for F was less than 0.05 ($F(2, 48) = 12.60$; $p < 0.05$), the factor task was considered significant. A p-value of less than 0.05 indicated that the factor complexity was significant. Put differently, $F(1, 24) = 14.20$; $p < 0.05$. Lastly, while the p-value for F was more than 0.05 ($F(2, 48) = 0.53$; $p > 0.05$), the interaction between task and complexity (task*complexity) was not significant. Thus, the task type and task complexity had a substantial main effect, but there was no significant interaction between the two. Overall, these complexity results show that both basic and complicated job performance were impacted by the complexity factor.

The results of this study show that participants' written performance is affected differently by task complexity, especially when it comes to correctness and grammatical complexity. These findings demonstrate the complexity of writing in a second language and imply that learners' allocation of cognitive and attentional resources during the writing process may be influenced by differences in task demands. The study focused on the impact of task difficulty on accuracy and syntactic complexity in essays written by EFL learners in order to investigate these relationships more thoroughly. The first research question looked at how much task complexity affected the participants' written output accuracy. The findings showed that the degree of accuracy in the essays rose to varied degrees based on the nature and features of the given task. This variance implies that specific work conditions might motivate students to focus more on grammatical accuracy and avoiding linguistic mistakes. In several instances, participants adopted a more cautious approach to language production in response to tasks that

were viewed as more demanding, which led to a higher degree of accuracy in their written output and more careful monitoring of grammatical forms.

Participants pay less attention to difficulty characteristics when the activity becomes more complex. As a result, we cannot assert that the following study's findings are consistent with Skehan and Foster's [10] model of task complexity, which holds that participants prioritize between complexity factors when task complexity increases because they are unable to focus on both at once. However, the following study's findings are similar to Robinson's (2001, 2005) task complexity model. The results of this model show that participants do not have to choose between complexity variables and have access to a variety of resources when performing tasks.

As an activity gets more complex, participants become less aware of its hard characteristics. Therefore, we cannot claim that the results of the following study are in line with Skehan and Foster's [10] model of task complexity, which maintains that participants select between complexity elements when task complexity grows because they are unable to focus on both at once. The results of the subsequent investigation, however, are comparable to the task complexity model proposed by Robinson (2001, 2005). The model's findings demonstrate that participants have access to a range of resources and are not required to select among difficulty variables when completing tasks.

4. Conclusion

The results of the subsequent research indicated that task complexity significantly impacted the complexity of participants' written outputs; however, no substantial effect was noted on the complexity aspect of their essays. In other words, while learners showed variations in grammatical accuracy depending on different task conditions, the complexity of their writing did not seem to improve to the same degree. This finding indicates that heightened task demands likely caused participants to focus their cognitive resources mainly on preserving accuracy instead of enhancing the complexity of their language production.

A potential reason for this result is related to how participants allocated their attentional resources while performing the writing tasks. The participants seemed unable to effectively prioritize the conflicting aspects of task performance, nor did they make full use of the cognitive resources at their disposal to simultaneously focus on both complexity and accuracy.

One potential reason for this result is how participants allocated their attentional resources while completing the writing tasks. The participants seemed unable to effectively balance the conflicting aspects of task performance, nor did they make full use of the cognitive resources at their disposal to address both complexity and accuracy at the same time. As a result, their focus might have mostly been on creating grammatically correct sentences, potentially restricting their ability to use more intricate syntactic structures or diverse linguistic forms.

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Conflicts of Interest: "The author declares "No conflict of interest".