

# A Review of the Effect of Task Complexity on Syntactic Complexity in Second Language Writing in China

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**Abstract:** In the 1990s, research on task complexity became prevalent and gradually scholars have investigated how task complexity of writing tasks affects second language learners' writing performance. Skehan synthesized a measure of learners' proficiency in second language writing in terms of complexity, accuracy and fluency (CAF) of linguistic output. Among them, syntactic complexity, which refers to the range of variation and complexity of the form of linguistic output, has received more and more attention from researchers of second language writing in recent years, and has become one of the hot spots of research in the field of second language acquisition. This paper relies on the CNKI to search for studies on effect of task complexity on syntactic complexity of L2 writing in China, and through summarizing, organizing and analyzing these literatures, it can be found that the theoretical guidance of existing studies is mainly based on the cognitive hypothesis, supplemented by the Limited Attentional capacity Model. Researchers have varied task complexity based on the resource-directing and resource-dispersing to investigate its effect on syntactic complexity, but the findings have not been consistent, which may be due to geographic pedagogical differences or subtle differences in study design.

**Keywords:** Task Complexity; Syntactic Complexity; Second Language Writing.

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## 1. Introduction

Writing, as one of the most important skills in second language acquisition, occupies an important position in English language teaching and has always attracted much attention from researchers. It's considered as a complex cognitive activity and the writing process can reflect the process of information processing and processing within second language learners. Skehan (1998) synthesized a measure of learners' proficiency in second language writing in terms of complexity, accuracy and fluency (CAF) of linguistic output. These three dimensions reflect the problem of allocating learners' attentional resources in the writing process from different perspectives. "Syntactic complexity is an important construct in the teaching and research of L2 writing, and its relationship with L2 learners' language proficiency, language development process, and writing quality has become the focus of L2 writing research" (Lu Xiaofei & Xu Qi, 2016), and it can be used as a measure of L2 learners' writing proficiency.

In recent years, with the rise of task-based teaching, researchers have gradually emphasized the impact of task itself on learners' English writing performance. The study of the effect of task complexity on L2 writing has gradually become a common concern for scholars and L2 learners at home and abroad. Relevant studies have shown that an increase in complexity significantly affects language output due to the limitations of language learners' cognitive resources (Skehan, 1998). There are two representative theories about the effect of task complexity on writing performance: Skehan's (1998) "Limited Attentional Capacity model" suggests that due to limited working memory capacity, there is a "competition effect" between complexity, accuracy, and fluency in writing performance. ". In addition, as task complexity increases, learners allocate more cognitive resources to content and language performance suffers (Skehan & Foster 2001). In contrast, Robinson's (2015)

"Cognitive Hypothesis model" suggests that learners' cognitive resources are multidimensional, and that task complexity encompasses different dimensions of cognitive resources: increasing task complexity along the resource-directing dimension (e.g., by increasing the number of elements) results in an increase in learners' linguistic output, accuracy and complexity, but fluency is affected; while increasing task complexity along the resource-dispersing dimension (e.g., no preparation time) consumes more cognitive resources, so that fluency and complexity are affected. accuracy and complexity improve, but fluency is affected; while increasing task complexity along the resource-consuming dimension (e.g., no preparation time) consumes more cognitive resources, and thus fluency, accuracy, and complexity are affected.

Most of the existing research on the effects of task complexity on learners' language use has been focused on speaking tasks (Samuda & Bygate 2008), while little research has been conducted on writing tasks. In this paper, we will focus on exploring the effect of task complexity on the syntactic complexity of linguistic output, especially writing output.

## 2. The Effect of Task Complexity on Syntactic Complexity

Existing studies have mostly used the cognitive hypothesis as a theoretical guide for the design of experiments or have combined the Limited Attentional capacity Model with the cognitive hypothesis to jointly set the task complexity of writing tasks. Moreover, researchers have mostly designed different types of writing tasks to explore the effect of task complexity on the syntactic complexity of second language writing using the resource-directing dimension of the cognitive hypothesis or combining it with the resource-dispersing dimension. In the following, the author will categorize and discuss based on the current status of such

research.

## 2.1. Resource-Directing Dimension

Yang Yingli (2023) investigated the effects of task complexity, conceptualization style and linguistic competence on second language writing performance with English major college students. The results showed that task complexity had no significant effect on the syntactic complexity of college students' English writing. Using Skehan's Limited Attentional Capacity model and Robinson's Cognitive Hypothesis as a theoretical framework, Wang Jingping (2013) conducted an experiment on 118 non-English majors in Chinese universities on the effects of different task complexity of resource-guided writing on language performance in second language writing, and the text was statistically and analytically analyzed in terms of fluency, accuracy, complexity. The results showed that the resource-guided writing was a good choice for the students. The results show that there is a significant difference between different levels of task complexity of the resource-guided approach on learners' accuracy in written language use, and there are effects on fluency and lexical complexity, but they are not significant, and there is no effect on syntactic complexity; learners' L2 proficiency plays an important role in the performance of written language, but there is no interaction between the task complexity and the L2 proficiency on learners' accuracy and complexity in writing, and there is an interaction between the task complexity and the L2 proficiency on fluency only. However, there is no interaction effect between task complexity and second language level on the accuracy and complexity of learners' writing language, only on fluency. Li Kuiqin (2015) investigated the effect of increasing task complexity in three dimensions of the resource guide category on the level of linguistic output. It was found that complex task complexity did not have a significant positive effect on linguistic accuracy; task complexity had a significant positive effect on turn-taking speed; it had a mixed, non-significant effect on syntactic complexity and lexical complexity; and an increase in task complexity in the context of resource guidelines had a negative, but non-significant, effect on linguistic fluency. These three studies show that changes in task complexity have essentially no effect or a mixed non-significant effect on the syntactic complexity of second language writing.

Han Yawen (2019) explored the effects of task complexity and working memory capacity on English language learners' written language output. Data on the written language output of the subjects with different levels of task complexity were collected in the form of essay writing, and the subjects' written language was analyzed in terms of three dimensions: accuracy, complexity, and fluency. It was found that increasing task complexity significantly reduced the syntactic complexity of learners' written output.

Using the "cognitive hypothesis" as a theoretical basis, Su Fengyan (2022) examined the effect of the number of elements included in the resource-directing dimension of foreign language writing task complexity on syntactic complexity and lexical complexity in second language writing output. After a writing test in an authentic classroom setting, Su found that increasing task complexity by varying the number of elements significantly increased the syntactic complexity of texts written by second language learners. This finding was reflected in the average length of clauses in the sentence length measure. As for the effect of task complexity

on lexical complexity, Su found that increasing task complexity promoted lexical rarity, class-symbol-to-shape-symbol ratios, and the diversity of real words such as verbs, nouns, and adjectives. Jin Hongyu (2021) explored the effects of task complexity, working memory capacity on second language writing performance, and the role of learner agency. According to the descriptive statistics, increasing task complexity promotes the average length of T-units in the syntactic complexity of second language writing; however, the increase in task complexity decreases the T-unit subordinate clause usage, and T-unit subordinate conjunction usage. While the group-level findings revealed a significant main effect of task complexity on both second language complexity and accuracy, the individual-level findings indicated that there was no significant correlation between these two dimensions. Overall, the findings do not support the relevant predictions of the cognitive hypothesis. Based on complexity theory, Zhang Chao (2021) analyzed the correlation statistics of the output corpus of 65 middle and high-level English language learners under different task complexity conditions on 12 occasions during a school year, in order to examine the relationship between task complexity and second-language writing performance and its dynamic changes. The results showed that task complexity was weakly positively correlated with syntactic complexity, text fluency and accuracy, and weakly negatively correlated with lexical complexity, which partially supported the "cognitive hypothesis". Secondly, in the course of the study, it was found that the correlation tended to change from negative to positive, with a shift from the "competing hypothesis" to the "cognitive hypothesis". This study starts from complexity theory and points out that the shift in the relationship between task complexity and bilingual writing performance is an adaptive process of the complex system of bilingual writing, which reveals the dynamic connection between the "competing hypothesis" and the "cognitive hypothesis". Starting from complexity theory, the study reveals that the shift is an adaptive self-organization process of the learner's linguistic complex system, and that the "competitive hypothesis" and the "cognitive hypothesis" are the two attractors of the learner's language development. In order to further explore the effect of task complexity on Chinese English learners' language output, Xing Jiaxin (2016) used a meta-analytic approach to integrate and analyze relevant domestic studies in China and made the following findings. First, existing studies in China involve different task complexity variables and use multiple language output measures. Second, task complexity has a positive effect on the syntactic complexity and lexical complexity of learners' language output, and a possible negative effect on accuracy and fluency. Moreover, the effect of output mode on the task complexity effect is not significant in terms of learners' language output complexity and accuracy, and is significant in terms of fluency. Finally, learners' language level, complexity control variables, and metrics are all potential factors influencing the task complexity effect. All these studies demonstrated that an increase in task complexity from the resource-directing dimension would have a positive contribution to syntactic complexity in second language writing.

## 2.2. Bidimension Mixing

Guo Jia (2021) set task complexity in conjunction with writing genre and writing topic thereby exploring the effect of task complexity on students' English writing output and

measured syntactic complexity by using the average length of sentences, average length of clauses, and length of sentences per T units. It was found that task complexity may facilitate or hinder students' English writing, which is not only related to the task itself, but also to the strategies used in teaching and learning, and that the geographic teaching characteristic X factor greatly affects the complexity of the writing task setting and students' writing output. In the same year, Han Yawen (2021) examined the effect of task complexity on ELLs' performance in argumentative essay writing based on two directions: resource-directing and resource-dispersing. By conducting simple task and complex task argumentative essay writing with 112 intermediate level English learners. It was found that learners' complex task argumentative essay writing increased in complexity and decreased in fluency and accuracy compared to simple task argumentative essay writing. Zhang Yujie (2020) used three writing question types that emerged after the English reform of China's college entrance examination-application writing, reading and writing afterward, and summary writing-as research materials to differentiate them in terms of task complexity. By analyzing the essays of 180 students, it was found that high complexity writing tasks help to increase the syntactic complexity of writing outputs, but have less effect on lexical complexity and accuracy. In addition, complexity and accuracy performance was influenced by task requirements and genre. Liu Bing (2017) set task complexity based on genre and topic to differentiate writing task types to study the effect of task type on task preparation and writing output. The results of the study showed that as task complexity increased, the ANOVA showed a significant increase in the level of syntactic complexity of writing output and a significant increase in the length index of lexical complexity. All of the above scholars' studies have shown that increasing task complexity contributes to the syntactic complexity of second language writing if the two dimensions of resource-directing and resource-dispersing work together to increase the complexity of the writing task.

At the same time, there are some studies that show that an increase in task complexity does not have any significant effect or even a slight negative effect on the syntactic complexity of second language writing. Based on the Cognitive Model and the Limited Attentional capacity Model, Li Zhen (2016) asked 40 English language learners to complete two argumentative essay writing tasks with different cognitive complexity to explore the effects of different levels of cognitive complexity on the written language performance of English language learners. To investigate the effects of different levels of cognitive complexity on English learners' written language performance. The task complexity was increased by controlling for four variables: involvement factors, reasoning requirements, preparation time and background knowledge, and the results showed that linguistic accuracy and lexical complexity decreased significantly, while syntactic complexity also decreased to a certain extent. Based on the Cognitive Model and the Limited Attentional capacity Model, Yan Rong (2015) also explored the effects of task complexity, task difficulty and self-efficacy on foreign language writing by using writing tasks of different complexity as experimental materials. After excluding the effect of target language level, the effect of task complexity on learners' overall writing performance and the accuracy, fluency and complexity of language expression was not significant. The study found that after excluding the effect of

target language level, the effect of task complexity on learners' overall writing performance and the accuracy, fluency and complexity of language expression was not significant. The study found that after excluding the effect of the target language level, the effect of task complexity on the learners' overall writing performance and the accuracy, fluency and complexity of language expression was not significant.

### 3. Conclusion

As far as theoretical frameworks are concerned, researchers have mainly explored under two theoretical frameworks: the cognitive hypothesis and Limited Attentional capacity Model, with the cognitive hypothesis being the main one. Fewer studies have been guided by the Limited Attentional capacity Model alone, but they have basically combined the two frameworks to adjust the task complexity of writing tasks to further investigate the effect of task complexity on the syntactic complexity of second language writing. The reason for this phenomenon is perhaps because the cognitive hypothesis has a more positive effect on L2 learners' writing performance, especially since the theory subdivided task complexity into two dimensions, resource-directing and resource-dispersing, and different cognitive requirements, such as the number of elements and prior knowledge, are presented more specifically under each dimension. This gives researchers a better reference standard for setting the task complexity of writing tasks, which is more conducive to the implementation and conduct of writing experiments.

Based on this choice of theoretical framework, most researchers chose to use the resource-directing dimension as a guide to change the task complexity, while a considerable number of researchers believed that the resource-directing dimension is not comprehensive enough for the cognitive demands of L2 learners, and therefore combined it with the resource-dispersing dimension to work together on the syntactic complexity of the writing task. However, the results of the studies are mixed, with most of them showing that increasing the task complexity of a writing task either from the resource-directing dimension or the resource-dispersing dimension promotes syntactic complexity in second language learners' writing. There are also some studies showing that changes in task complexity do not have a significant effect on syntactic complexity. In addition, there are several studies that show that increasing task complexity has a negative effect on syntactic complexity. The reason why the results of the effect of task complexity on syntactic complexity of writing have not been standardized so far may be due to the numerous factors affecting the writing performance or syntactic complexity of L2 learners' writing, such as geographic pedagogical factors. It is also difficult for researchers to control only a single variable in writing experiments conducted in real classrooms, which may be affected by many factors such as the experimental method, the subjects, and the order of writing. The subsequent researchers may choose more comprehensive measures to systematically measure the developmental changes of learners' syntactic complexity, and they may also focus their perspectives on the design of writing tasks, especially the new types of college entrance examination writing questions, in order to explore the differences in second language writing outputs. Researchers can further design tasks with different levels of complexity to explore the performance of learners' second language writing output, and provide thoughts and insights for the learning and

teaching of second language writing.

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