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A Review of Factors Influencing Syntactic Priming in Chinese English Learners Over the Past Decade

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Abstract: Syntactic priming plays a crucial role in language teaching and learning. This paper reviews studies on syntactic priming among Chinese English learners over the past decade, highlighting the various research paradigms employed, such as picture-description paradigm, sentence-fragment completion paradigm and continuation paradigm, as well as their respective advantages and disadvantages. It also delves into three key factors that influence syntactic priming: learner characteristics, material features, and test task, examining these factors from multiple perspectives, including working memory, repetitive words, and task intensity. By comparing different studies, the paper points out how these factors function and discusses whether they have a positive relationship with syntactic priming. Also, possible reasons for the contradictory findings in some studies have been explored. The paper concludes by summarizing current research finding, putting forward problems existing in present studies, and identifying gaps for future exploration, aiming to offer insights and directions for ongoing research in this area.

Keywords: syntactic priming, Chinese English learners, English language teaching.

1. Introduction

Syntactic priming, also known as structural priming, refers to the phenomenon where individuals are more likely to produce sentences using syntactic structures that they have recently processed [1]. For Chinese ESL learners, who often encounter challenges in both comprehension and practical language use, syntactic priming offers a potential approach for improving language acquisition efficiency. Over the past decade, research on syntactic priming has primarily focused on various influencing factors, such as working memory [2], language competence [3], and the specific structures or words present in priming sentences [4]. It is important to note that different studies sometimes yield contradictory conclusions regarding the same influencing factors. Despite this, current reviews have inadequately addressed the factors affecting syntactic priming and lack a consistent standard for comparing related research. Consequently, this study aims to provide a comprehensive review of the factors influencing syntactic priming among Chinese ESL learners, drawing on research from the past ten years.

Using keywords such as "syntactic priming," "structural priming," and "English," a search was conducted in the China National Knowledge Infrastructure (CNKI) database. Out of 36 articles identified, 16 were deemed relevant to the theme and selected for analysis. The discussion proceeds as follows.

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2. Research Paradigms

The corpus of 16 articles under review harnesses a diverse array of research methodologies, with a particular prevalence of three paradigms that have emerged as dominant: the picture-description paradigm, which facilitates the exploration of cognitive processes through visual stimuli; the sentence-fragment-completion paradigm, designed to elicit the subject's linguistic competencies and syntactic understanding; and the continuation paradigm, which encourages narrative construction and the examination of discourse coherence. In addition to these, an eclectic mix of other paradigms is employed throughout the articles, each contributing unique perspectives and methodological richness to the discourse, and these will be subsequently elaborated upon in the following sections.

2.1. Picture-description Paradigm

Five of the 16 articles have adopted this paradigm. In this approach, researchers provide priming sentences that describe pictures either visually or auditorily and ask participants to view, listen to, or orally repeat these priming sentences before describing other target pictures [5]. The primary advantage of this paradigm is that participants are more likely to use the priming structures, as oral descriptions generally require less response time compared to written descriptions. However, the level of participant engagement in the task may influence the strength of the priming effect.

2.2. Sentence-fragment-completion Paradigm

This paradigm is also employed in five of the 16 articles. For example, in Dai and Cheng's study, participants were trained to complete sentences using priming structures (specifically, double-object structures) [6]. Subsequently, they were asked to complete target sentences based on their first impulse, which could be done using either double-object (DO) or prepositional-object (PO) structures. The advantage of this paradigm lies in the clarity and ease of analysis of the results, with the key variable being the syntactic structures. However, this paradigm may not fully reflect real-world language use, as it does not involve the independent production of complete sentences.

2.3. Continuation Paradigm

Three articles employed the continuation paradigm. In the study by Wang and Cao [7], researchers edited a story with the ending omitted, creating two versions: one containing sentences in passive voice, and the other containing only active voice. Different groups of participants were asked to complete the story after reading either version. On the one hand, the results provided insight into participants' concerns, as they had to produce the texts independently. On the other hand, the lack of guidance made it difficult for participants to consistently produce the target structures.

2.4. Other Paradigms

One article adopted the confederate-scripting paradigm. In Xia and Wang's study, an assistant acted as a confederate to complete the picture-description task with the participant. After the assistant provided the priming sentence, the participant was required to match the sentence with the given pictures, with the two taking turns in this task [8]. The true purpose of the test was concealed from the participant, who was told they were being tested on their ability to extract information from images. The advantage of this paradigm is that it produces more convincing results, as the confederate effectively masks the experiment's true intention, preventing participants from being consciously aware of the study's aim. However, this paradigm should be used in conjunction with other methods, such as the picture-description paradigm. Additionally, Chinese-English translation and sentence-recall paradigms are utilized in four articles. While these methods facilitate easy feedback

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examination, they may also lead to a mechanical process that does not accurately reflect real-world language use.

2.5. Summary

In summary, the picture-description and sentence-fragment-completion paradigms are the most frequently used, likely due to their ability to actively engage participants and yield clear and convincing results. The picture-description paradigm can be enhanced by combining it with the confederate-scripting technique, which minimizes potential confounding factors. On the other hand, the sentence-recall paradigm is constrained by participants' working memory capacity, making it more suitable for simpler sentences. However, it is important to note that some paradigms were administered in written form, while others were conducted orally; the studies did not account for participants' proficiency levels in these two modalities, which could lead to significant variations in the results if the tasks were administered in the alternate form.

3. Learner Factors Influencing Syntactic Priming

3.1. Working Memory

Previous research has demonstrated that working memory positively influences syntactic priming. In a study by Wei and Jin [2], sophomores who were non-English majors and had an average score of 530 on the CET4 were selected as low-level subjects. The study found that in L2-L2 priming, higher working memory capacity correlated with a stronger priming effect. This effect is likely linked to the recognition functions of working memory: learners with lower working memory capacities tend to focus less on the priming structure, whereas those with higher capacities are more attuned to it [2]. Additionally, another study revealed an interactive relationship between working memory and language proficiency. In Xu's study [3], participants were divided into two groups: low-level learners, consisting of English major freshmen, and higher-level learners, consisting of English major juniors, all of whom had scored over 70 on the TEM4. The study suggested that in L1-L2 priming, when L2 proficiency is low, stronger L1 working memory results in stronger syntactic priming. Notably, the low-level subjects in Wei and Jin's [2] study are comparable to those in Xu's [3] study. Both studies support the notion that for low-level learners, working memory significantly contributes to the syntactic priming effect.

3.2. Language Proficiency

The majority of studies suggest that high language proficiency enhances syntactic priming. For instance, Wang and Cao found that English major postgraduates, considered highly proficient, exhibited strong syntactic priming due to their familiarity with the structures, making these structures more readily accessible [7]. However, Xia and Wang argued that language proficiency does not have a consistent impact on syntactic priming [8]. In their study, first-year non-English major postgraduates were divided into high and low proficiency groups based on the Oxford Quick Placement Test. They posited that language proficiency is not a consistent factor in syntactic priming: if the target structure is complex, even learners with high proficiency may struggle to grasp it, leading to similar syntactic representations between high and low-level learners; conversely, if the target structure is simple, learners of all proficiency levels may produce it frequently, resulting in a more stable syntactic representation. Thus, the impact of language proficiency on syntactic priming appears to depend on the complexity of the target structure and the stability of its syntactic representation.

These differing perspectives may hinge on the concept of syntactic representation. Studies that suggest a positive relationship between language proficiency and syntactic priming often focus on

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the stability of syntactic representation. High-proficiency learners typically do not adhere to a fixed syntactic representation, allowing for more improvisation, whereas low-proficiency learners tend to rely on familiar structures. Therefore, the issue may be more about syntactic representation, and each case should be examined individually.

It is also important to note the significant variation in how different studies define and measure language proficiency. For example, Wang and Cao selected participants from different academic levels [7], while Xia and Wang relied solely on test scores to distinguish proficiency levels within the same academic year [8]. This inconsistency in defining proficiency across studies could significantly impact conclusions regarding the effect of language proficiency on syntactic priming.

4. Materials' features Influencing Syntactic Priming

4.1. Repetitive words

When specific words are repeated frequently, the structures they represent are more likely to be primed. Yang, Wang, and Wei found that when exposed to repeating verbs as a priming condition, higher-proficiency subjects were more likely to produce target structures [9]. In contrast, when the verbs were not repeated, there was little abstract priming effect. This suggests that learners may attach syntactic representation to certain concrete words, and that lexical boost effects are reinforced as L2 proficiency develops, as the connection between lexicon and syntax strengthens to form syntactic representation.

4.2. Priming Structures

Specific words can have a significant priming effect, and at the sentence level, their structures also influence syntactic priming. According to Xu [10], syntactically indeterminate verbs, such as "accustom" when used as a reflexive causative verb, can limit the priming effect due to their complex syntactic-semantic connections. These verbs can form various syntactic structures, such as reflexive and adjective-passive sentences, with the priming effect being modulated by these syntactic characteristics. Xu's study explored complex syntactic structures using verbs with multiple syntactic possibilities, while Zhao and Jiang investigated how differences in thematic roles affect priming under a consistent syntactic structure [11]. They argued that the number of thematic roles impedes syntactic priming in high-level learners, but not in low-level learners. Participants were less inclined to be primed by sentences with more thematic roles, likely due to the complexity of the sentence structures. This highlights not only the role of different sentence types but also the influence of language proficiency, as discussed earlier.

It is noteworthy that Xu's study involved English major sophomores [10], while Zhao and Jiang included English major freshmen as low-level subjects and postgraduates as high-level subjects [11]. As a result, the language proficiency levels of the participants were not consistent between the two studies, which could potentially influence the conclusions drawn.

4.3. Structure Preferences

Structure preferences, often referred to as typical expressions, reflect a tendency for participants to use familiar structures. Cai and Wang observed that typical L1 structures can provide a priming condition for L2 production due to the transferable long-term experience with L1 [4]. Similarly, Yang, Wang, and Wei showed that the production of double-object (DO) structures occurred frequently when commonly used verbs were involved, as these structures are more robust in the learners' linguistic repertoire [9].

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5. Tasks of the Tests Influencing Syntactic Priming

5.1. Cumulative and Recency Effect

The cumulative effect refers to the priming effect that builds up as a result of exposure to multiple priming sentences, and it is closely related to the frequency of such exposure. For instance, Wang and Wei controlled the frequency of priming sentences in their study [12]. They found that when subjects were exposed to a skewed set of pure double-object (DO) sentences during the priming stage, they subsequently produced a higher number of DO sentences. This outcome suggests that extensive exposure to a specific sentence type leads to an increased likelihood of producing the same type of sentence, thereby providing evidence for the cumulative effect.

However, Dai and Cheng challenged the findings of Wang and Wei regarding the recency effect [6] [12]. The recency effect refers to the phenomenon where the most recently presented information is more likely to be recognized and processed, leading to a stronger memory retention. This effect is associated with the temporal distribution of information. Dai and Cheng argued that in the context of the cumulative effect, the influence of frequency is so dominant that it overshadows the temporal distribution, preventing the recency effect from manifesting [6]. In their study, temporal distribution was treated as an independent variable, and the confounding influence of frequency was controlled. Their results supported the existence of a recency effect in syntactic priming, contrary to the findings of Wang and Wei [12].

5.2. Paradigms Adopted in the Tests

The choice of experimental paradigms can lead to significantly different conclusions. Wang and Zhou observed that in continuation tasks, where subjects are required to handle a substantial cognitive load, they have insufficient cognitive resources to focus on and anticipate the target structure [13]. As a result, structural preferences have a positive effect on syntactic priming, which contrasts with traditional research findings. The key difference lies in the fact that traditional paradigms do not require subjects to complete a coherent task. When priming sentences do not align with the subjects' preferences, an inverse frequency effect may occur. The findings suggest that continuation tasks are more practical, and the variations in conclusions across studies are attributable to the differences in the paradigms employed.

5.3. Intensity of Tasks

The intensity of tasks is conceptually similar to the cumulative effect, but with a focus on the frequency of task engagement rather than sentence structure exposure. The intensity of tasks refers to the number of times subjects process priming sentences. Xue, Pan, and Guan found that subjects in a group required to listen to and repeat descriptions of images before describing them on their own exhibited a more pronounced priming effect than those who were only asked to describe images independently [5]. The researchers concluded that the intensity of the task enhanced learners' syntactic proficiency by linking semantic meaning with syntactic structures. Thus, repetition and reinforcement played a crucial role in language learning, underscoring the importance of task intensity in the acquisition of syntactic knowledge.

6. Conclusion

This study has reviewed research from the past decade on factors influencing syntactic priming among Chinese ESL learners. The analysis identified three primary factors: learner characteristics,

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material features, and test tasks. Each of these factors was discussed in detail, with an examination of the reasons behind the conflicting conclusions found in some studies.

However, there remain several areas that require further exploration. Firstly, regarding language proficiency, there is a lack of a consistent standard in the field, which leads to disordered analysis and conclusions across different studies. Future research would benefit from establishing a standardized measure of language proficiency, making it a controllable variable in experimental design. Secondly, experimental designs need to be more comprehensive. Current studies often employ either oral or written paradigms, but they fail to account for subjects' varying competencies in these two modalities. For Chinese ESL learners, written competence is typically stronger than oral competence. Whether this discrepancy results in a more pronounced syntactic priming effect in written tests compared to oral tests remains an open question.

Lastly, research on syntactic priming is still in a developmental stage, with several theories lacking unanimous agreement and many studies yielding contradictory findings. While possible explanations for these inconsistencies have been suggested, further empirical testing is necessary to validate these theories and determine which findings accurately reflect the realities of language acquisition. Conducting experiments in authentic English teaching contexts could offer additional insights and contribute to a more robust understanding of syntactic priming among ESL learners.

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