

Inspirations of Automatic Speech Production Research to Foreign Language Teaching

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ABSTRACT

This paper is about the promotion to foreign language teaching from the automatic speech production research in syntactic priming experiment, which use E-prime2.0 and its SR-Box to college students to do online experiment. The research findings indicate that among many personal factors, language proficiency, especially L2 level, is significantly correlated with L2 speech production of Chinese-English imbalanced bilinguals. In Chinese-English imbalanced bilinguals, the higher level shows the better the priming effect. That is, because of the cascade of priming produced by external stimulation, the formation of procedural automatic processing is affected by L2 level (the perfection of mental lexicon and declarative rule system). The following educational suggestions and research innovations could be put forward to the readers from the four aspects of repeated practice, listening training, knowledge training and first language training.

Keywords: *automatic speech production, syntactic priming, imbalanced second language learner, foreign language teaching*

I. INTRODUCTION

Is the priming learning mechanism equal to the learning mechanism of language acquisition? Syntactic priming is a product of how man's thinking learns and remembers language materials, and so is language acquisition. Therefore, it is natural for people to think that priming is related to external information acquisition and syntactic priming is a continuation of language acquisition, which is the core feature of many priming researches. The research of this paper is based on this idea; the priming experiment is in accordance with the syntax launch of different experiments. The results (Rouhua Wang, 2018 a, b, c) proved that the stronger degree of priming, the better the speech output, which proves that the multichannel input more stimulates the research subjects of speech production, to accelerate the process of the automatic processing, so as to achieve the acquisition of the target language. This paper summarizes the findings of experimental research, theoretical enlightenment, application value and enlightenment on foreign language teaching, but this study also has shortcomings and needs further research.

The research results of the previous research in this article (Rouhua Wang, 2018 a, b, c) allow people to re-examine the foreign language teaching model and provide psychological experimental data support for the teaching effect of repeated exercises. The essence of the syntactic priming effect is actually the stimulus

produced by repetitive exercises on cognitive processing to affect the speech output (spoken language production). The priming effect is reflected in two aspects that can enhance the accuracy of the target language (second language, third language) speech output (the output ratio of the target sentence) and the reaction speed (the response time of vocalization). In the foreign language teaching model, in addition to the communicative method, translation method, direct method and other teaching methods, the teaching effect brought by repetitive exercises should not be ignored in the early and middle stages of learners' foreign language learning.

II. EXPERIMENTAL RESULTS OF AUTOMATIC DEVELOPMENT OF THE SECOND LANGUAGE

The experimental results of syntactic priming in the previous research results of this article (Rouhua Wang, 2018 a, b, c) show that imbalanced Chinese-English bilinguals are at the low-to-medium level of English learning. When they are influenced by the previous priming (i.e. repetition) of the syntactic structure, that is the presence of the syntactic priming effect. The degree of priming will raise the stronger priming, that is, compared with the single-channel input of only watching or listening, the two-channel input stimulus that allows the students to read, read aloud, listen and follow, will lead to higher results of the output priming

of the students' speech components. At the same time, it also speeds up the student's growth.

The retrieval of L2 declarative rules and mental lexicon conceptual layer, semantic syntax layer and phonological layer are of temporal memory (when hearing is activated, the phonological layer is stimulated stronger and the priming effect is more obvious). If the whole process is regarded as a procedural building block, the automatic process of promoting learners' speech output can be initiated through syntax. Initiation (i.e., repetition) can increase the number of unbalanced bilinguals' speech output of the L2 target structure (increased output ratio), the speed (reaction time shortened), and the overall output effect (increase comprehensive priming).

Among them, the auditory priming in English intra-language priming is better than the visual priming in terms of quantity and overall priming effect. However, in terms of response speed, the English visual priming is faster than the English auditory priming, which proves that the foreign language knowledge system of balanced bilinguals is not complete. And the listening comprehension and output speed will be affected.

When cross-language Chinese initiates English, the subjects' English verbal output is also better for auditory stimulation. In the same case of visual priming, English visual priming is generally better than Chinese visual priming. Compared with the Chinese-English priming, the English priming is generally better than the Chinese cross-language priming in terms of visual and auditory perception. Moreover, it is worth noting that compared with the Chinese auditory priming, the English target structure output quantity and the overall priming effect are better, but the bilingual subjects have experienced the imbalance after the priming.

The priming effect is stronger than the English auditory priming. That is to say, when the target language of the shared syntactic representation is produced online, the native auditory priming stimulus can speed up the L2 production response speed of unbalanced bilinguals. This proves that the mother tongue auditory priming stimulus can not only automate the cognitive processing of the mother tongue, but also accelerate the cascade priming explanation of the cognitive process of the priming structure stimulation.

Based on the results of these studies, the following conclusions can be drawn. First, frequent stimuli such as repeated exercises in the second language learning process can promote L2 speech production. That is to say, intensive training of vocabulary language structure can improve second language generation and output ability. Second, in the process of second language learning, auditory input and stimulation in L2 language can more effectively promote L2 speech output. This proves that listening stimulation training can effectively

improve second language output. Third, the storage of second-language vocabulary and syntax knowledge is crucial to the output and speed of the second language. This shows that in order to improve second language production ability, the training and accumulation of second language vocabulary and syntax knowledge should be strengthened in teaching. Fourth, for Chinese-English shared syntactic representation, the input of the corresponding structure of the mother tongue has a positive effect on the amount and speed of second language output. In other words, knowledge of mother syntax helps to acquire knowledge of second language. Therefore, the positive role of mother tongue cannot be ignored in second language learning.

The academic value of the automatic speech production research in syntactic priming experiment is reflected in the following three aspects.

First, research using the syntactic priming paradigm can systematically reveal the process of speech production, which includes not only the assumption of the residual priming mechanism of the syntactic node and core verb vocabulary, but also the shared syntactic representation as English and Chinese sentence comprehension and Common use of output. The experimental data can be used to explain the corresponding theories and models of the syntactic initiation phenomenon of different degrees, different methods and different languages, can provide a new theoretical framework for the research on the speech output of college students.

Second, detailed description of how bilinguals' syntax is represented. Therefore, this research can not only explain the L2 speech production process, but also help reveal the operating mechanism of college students' speech cognitive processing stage. Most of the existing research in the field of speech production focuses on the error analysis of syntactic representation, rather than the cognitive processing process. Even the research focused on the cognitive processing process, it is mainly concerned with information generation, coding mechanism and speech generation mechanism, rather than automatic processing mechanism.

Third, this study assumes that the enhancement of memory will trigger the development of automaticity. That is, the connection between response and stimulus becomes stronger as the memory is strengthened, so as to achieve the building block and subsequent programming.

III. THE ENLIGHTENMENT OF RESEARCH RESULTS ON FOREIGN LANGUAGE TEACHING

According to these research conclusions, it is possible to make full use of syntactic priming in foreign language teaching of English passive structure in the communication in the classroom environment. The

study can offer the following enlightenment to the foreign language teaching:

Conclusions can be made based on the experimental results of different priming levels. In second language learning, multi-channel repetitive drills will promote the oral English expression of middle-level or low-level English learners more than single-channel repetitive drills. The so-called multi-channel repetition means that in the learning process, the second language teacher can allow students to read more about the target structure of the English texts they are learning while reading aloud and listening, which can promote the verbal expression and learn more than just watching or listening.

According to the experimental results, there is no doubt that the syntactic priming effect exists. Then the teaching methods that the priming research can learn from are not only the speech output described by the picture, but also the research methods such as sentence completion task, sentence recall task and alliance script technology. In foreign language teaching, it is necessary to promote the learner's acquisition of foreign language structure. In addition to syntactic structure, the teacher can also initiate teaching of foreign language information fragments that can constitute a fixed usage, and even dialogue question and answer. The contextual cohesion can also be used to enable students to automatically process foreign language related structures through the priming method. Reflected in the specific teaching process, it is repeated exercises. The enlightenment of the priming experiment research results in this part for teaching is that a higher degree of priming, that is, multi-channel language information input stimulation brings better priming effect.

So in actual teaching, more channels and methods should be used at the same time for repeated training of target structures (words, phrases, sentences, conversations). For example, many methods such as watching, reading, listening, retelling, recalling, complementing information, and alternative grouping are used in combination.

Syntactic priming in addition to the classic picture description task and other methods of initiating research are also worth learning by foreign language teachers. For example, learn from the confederate scripting technology (Branigan et al. 2000, 2007; McDonough 2006), let two students of high level and low level pair, and each pair of students designates one of the students with higher foreign language proficiency as the ally. The assistant of the task helps another student use the syntax to initiate the speech output of the syntactic structure of the foreign language.

This resource is also through the initiation of external syntactic information input to achieve inductive L2 speech output. In a picture description task,

two students took turns to describe the concept scene on the picture. The confederate read out the sentence pattern specified on the target picture in advance, and another student described the picture of the sentence pattern script on his hand, thereby realizing the initiation of the target sentence pattern. This finding can help students in the implicit acquisition environment to produce sentences that are not originally intended to be used more quickly and effectively. The design of the picture script can also be based on the actual textual context of the sentence usage in the corpus, so as to realize the priming and binding of the syntactic function of the passive structure.

In English teaching, auditory training can improve the accuracy of second language output and comprehensive learning effect for learners in the early and middle stages of foreign language learning. However, because many learners' English proficiency is at a low level, their English listening is weak. Therefore, the input training of English visual syntactic structure should be applied, if the teacher wants to improve the learners' second language output. In other words, the training of visual syntactic structure allows learners to produce oral English more quickly.

According to the research results of Chinese-English cross-language initiation, learners can promote the generation of spoken English through the input of Chinese syntactic structure equivalent to the concept of English syntactic structure. The syntactic structure of English and Chinese concepts is equivalent. Compared with the training of the visual channel and the auditory channel of this structure in Chinese, the repetitive training of listening can more efficiently promote the learners' oral English expression. It should be emphasized that to improve the reaction speed of spoken language generation, the effect of this syntactic structure of English visual input practice is better than English auditory input.

Experiments with the same visual channel or auditory channel show that in the second language teaching process, the audio-visual channel can more effectively promote the learner's spoken English output than the auditory input repetitive training. Repetitive training of English input in both English and Chinese can more effectively promote learners' spoken English syntax output, that is to say, listening training and English intra-lingual training can more effectively improve the second language output ability. What cannot be ignored is that for improving the speed of oral English production of middle and low level learners, the English visual training of the target structure is better than the English auditory training, and the Chinese auditory training is better than the English auditory training.

Syntactic priming effect has a good effect on the English sentence pattern speech output of Chinese

college students of different foreign language levels. Among imbalanced bilinguals, relatively high-level L2 learners are more sensitive to sentence pattern priming for low-level learners. This syntactic priming study found that the higher the English proficiency of bilinguals with Chinese-English imbalance, the greater the influence of the priming effect. This research also proves that the priming effect can effectively promote the accurate and rapid acquisition of the target syntactic structure. Moreover, many studies have confirmed that structural priming is not limited to the impact of the syntactic structure level, but can actually contribute to the initiation of sentence patterns as a form-meaning or form-function pairing (Chang et al. 2006, 2012).

Previous studies have confirmed (Rouhua Wang, 2018a, b, c) that Chinese-English bilingual speakers will be affected by the substitution effect of the structure in their native language when they acquire the passive structure of English. If the core verbs of the sentence that appeared in the initial sentence of the mother tongue, the English verbs of the same meaning appear in the picture description task, and the learners will be still more inclined to use the syntactic structure (such as the passive structure) that was applied before the verb for speech production.

The core verbs of Chinese initiation sentences have a significant tendency to correlate with the initiation sentence patterns, which will make learners more inclined to use the initiation sentence patterns in which Chinese verbs equivalent to the repeated English verbs are used in actual class. At the same time, they will ignore or avoid using other alternative syntactic structures of the verb in a specific context. In the compilation of English passive structure teaching materials, the difference in vitality levels of verb agent nouns and verb recipient nouns can also promote learners to acquire the target structure more efficiently. When the noun's vitality level difference is 2, the most passive structures are produced, and when the designed vitality level difference is 1, learners can produce English passive structures more quickly.

One of the most important roles of a language teacher is to promote the development of the language learning ability of the students (including native language teachers and foreign language teachers). In the process of second language learning, language teachers are most interested in helping second language learners use more scientific, efficient and interesting methods, and finally master a foreign language that is not their native language. If teachers use language research on a regular basis to provide suggestions and help for their teaching practice, then the teaching effect in all aspects may be more satisfactory. The sufficient and necessary reason why researchers conduct language acquisition research is that teachers will have more motivation to

teach, and students will also have more motivation to learn.

Initiating research is particularly useful for the choice of second language teaching methods. More specifically, the connection between initiation and implicit learning is close. Initiation is an implicit and almost "universal" repetitive driving phenomenon, which can help L2 teachers understand how learners handle L2 input. How do learners do second language learning implicitly, and how do teachers do second language teaching more implicitly? And how teachers can get the benefits of repeated language teaching models from the classroom and online learning? This is the application value of this research.

This study found that frequent stimuli such as repeated exercises in the process of second language learning can promote L2 speech production, that is, intensive training of syntactic structure can improve second language production and output ability. In other words, enhanced input or correction can affect the learning comprehension of second language learners in classroom teaching (Gass, 1997, 1999). For example, Jensen & Vinther (2003) studied the comprehension and grammatical accuracy of Spanish L2 learners by using repeated forms to enhance input. They found that after all three combinations of speech rates, repeated exposure to the video led to a significant increase in the participants' understanding speed and grammatical accuracy.

Priming research has shown that repetition of vocabulary or syntactic structure may bring more benefits to language learning (Pickering & Branigan, 1999, 2002; Ellis, 2002). Priming refers to a phenomenon of language or speech production in which people tend to use words, sounds or related syntactic structures (or even the same vocabulary or structure) that they have heard or read before. In the teaching process, priming can also be applied to the following example: When the expression "Thanks very much!" is heard, another interlocutor who speaks the same language is usually guided to use "You're welcome" as the response. This is not just a repetition of the syntactic structure of the initiation, but a manifestation of the meaning unit of conversation as a building block stored in long-term memory, which is also the initiation. The application of initiation is so extensive and the effect is very obvious. Foreign language teaching workers can be inspired by the initiation research paradigm itself, and guided by the actual operation of language teaching with the relevant results of the initiation research.

For example, in foreign language teaching, students can use priming when they produce English language. The most commonly used ones are vocabulary priming and syntactic priming. For example: Give students some vocabulary, and when they hear these words, they

will repeat the vocabulary they heard beforehand faster (Trofimovich, Gatbonton, 2006; Fan Jiang, 2014). When students hear or read sentences with double object structure (e.g., The man is reading his son a story) before describing pictures in English, they prefer to use double object structure to describe pictures (e.g., The girl is giving her teacher an apple). This is a typical example of using syntax or structure to prime. In this sense, repetitive drills can reflect the immediate and intuitive teaching effects brought about by the priming in foreign language teaching.

At the same time, initiating research can test various issues for researchers in foreign language teaching. First, initiating research can help researchers to discover problems with implicit learning (usually learning that is done unintentionally or unconsciously). Second, the initiation of research can enable researchers to gain insight into the process of cognitive processing.

Moreover, researchers can also use priming as a methodological tool to understand how language users organize language knowledge. During the priming experiment, researchers used various tasks to observe the priming effect (Pickering & Branigan, 1999). It is precisely because of the priming effect measured in their experiments that researchers can determine the effects of repetition in language learning and use (Bock & Griffin, 2000; Savage, Lieven, Theakston, & Tomasello, 2006, 7; Lei Lei, Tongshun Wang, 2009; Hao Xu, Caifeng Gao, 2008; Fan Jiang, 2014; Saihui Xia, 2017; Cuihong Yu, Yongzheng Jiang, 2017; Wang Rouhua, 2018c).

Then the research results obtained in the priming research can not only show how language learners process language in the context of psycholinguistics laboratory, but also inform students how to learn language more effectively in the classroom, thereby improving Chinese language teaching, and promoting learners to learn language knowledge.

IV. RESEARCH LIMITATIONS AND THE FOLLOW-UP RESEARCH PLANS

Due to economic and technical constraints, this study still has many shortcomings. This section will make the following self-examination and planning on the research limitations of this study and future research plans respectively.

This study only applied the picture description task displayed by E-prime2.0, and examined the two-way prime (watch & read, listen & follow), one-way prime (watch & don't read, listen & don't read) and control the non-prime group the cross-language, cross-channel syntactic priming. Regarding the priming effect of intralingual syntax, this study only examined the syntactic priming of L2 to L2, and did not investigate the priming of L1 to L1. In terms of cross-language

syntactic priming, this study only examined the Chinese-English cross-language syntactic priming effect of L1 to L2, and did not examine the reverse syntactic priming of L2 to L1.

In the process of research, this study found that for two-way prime, there can also be two prime methods: simultaneous two-way prime and delayed two-way prime. Simultaneous two-way prime means that the participant reads and listens to the priming material; while the delayed two-way prime means that the participant reads the priming material and then repeats it after listening. The research results of these two priming methods should be different. The two-way prime in this article only uses simultaneous two-way prime.

This study did not conduct experimental investigations on truly high-level bilinguals. This study is not concerned about native English speakers, or high-level second language speakers who have passed the English Major Test Band 8 or IELTS score above 7.5. In addition, this study did not investigate the syntactic priming of balanced bilinguals with the same proficiency in the second language and the mother tongue. This is also the direction of the follow-up research.

V. CONCLUSION

The following educational suggestions and research innovations could be put forward to the readers.

A. Repeated practice

In the process of second language learning, repeated practice and other frequent stimulation can promote the production of L2 speech. Picture description, partner script, sentence recall and sentence completion tasks are all stimulative through repeated practice. Repeated practice of simple knowledge can also promote the generation of high-level syntactic structure.

B. Listening training

In the process of second language learning, auditory input and stimulation in L2 language can more effectively promote L2 language output, that is, listening training can more effectively improve the output capacity of second language.

C. Knowledge training

The reserve of lexical and syntactic knowledge of the second language is crucial to the output and the speed of the second language production, which indicates that to improve the output ability of the second language, the training and accumulation of lexical and syntactic knowledge of the second language should be strengthened in teaching.

D. First language training

For Chinese-English Shared syntactic representation, the input of the corresponding structure of the mother tongue has a positive impact on the quantity and the speed of the output of the second language, that is, the syntactic knowledge of the positive first language transfer is conducive to the acquisition of the relevant knowledge of the second language.

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