

Deficiencies in the Scope of Developmental Stuttering Speech Plans

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Abstract

This paper briefly introduces the process of speech production, EXPLAN model and the scope of speech planning, reviews recent studies on speech planning scope for developmental stuttering, and expounds the defects of the scope of speech planning for developmental stuttering. The aim is to provide more direction for the research of stuttering theory and some reference for the solution of stuttering problem.

Keywords: developmental stuttering, speech planning scope, deficiency

1. Introduction

Language is a bridge of communication between people and an indispensable tool for human communication. With the development of The Times, people are more closely connected with each other and communicate more frequently. Oral speech, as the main means of communication, has played a great role and become more and more important, even affecting people's survival and development.

Stuttering is a common speech fluency disorder, commonly known as "stuttering". The World Health Organization defines it as: "a speech rhythm disorder, in the process of speech, individuals clearly know what they want to express, but uncontrolled pronunciation repetition, drawn-out or pause, resulting in difficulties in speech expression" (World Health Organization, 1977). Stuttering can be divided into developmental stuttering and acquired

stuttering. Developmental stuttering mainly refers to stuttering that begins in childhood and persists into adulthood, with an incidence of about 1%. Developmental stuttering is the most common form of stuttering, accounting for more than 80% of cases. Therefore, this paper mainly discusses developmental stuttering.

With the continuous development of the research on stuttering, people start from the perspective of psycholinguistic, and get similar results under different language families, stuttering ages, research techniques and experimental paradigms. It is found that there are defects in the speech planning scope of stutterers, which is reflected in the small speech planning scope, and affects the fluency of speech, which is one of the causes of stuttering. Therefore, it is helpful to study the defects of the speech of stuttering people, which is conducive to a deeper and comprehensive understanding

of stuttering, rich and perfect stuttering theory, and provides reference for the correction work of stuttering.

2. Speech Production Process

The process of speech production can be divided into three stages: the conceptualization stage, the speech organization stage and the pronunciation stage (Levelt, 1989; Roelofs, 1992). The conceptualization stage is when the speaker understands what he is saying, and conceptualization is a controlled and highly automated process (Bock, 1982). Levelt (1989) further divides the speech organization stage into grammatical coding and phonological coding. The semantic and grammatical information of vocabulary is extracted in the syntactic coding stage, while the phonological information is extracted in the phonological coding stage.

To understand the causes of stuttering, it is necessary to identify the stage of speech production in which the problem occurs. Studies have shown that stutterers have no abnormalities in lexical access, general auditory monitoring ability and manual response (Zhang & Xiao, 2008). In addition, stutterers have no defects in sentence comprehension. The brains and vocal organs of stutterers are usually free of defects (Howell & Au-Yeung, 2002). Then the cause of stuttering may be in the stage of speech organization, and it is the abnormality in this stage that leads to stuttering. Pronunciation repetition, procrastination and pause are essentially the external manifestations of problems in the stage of speech organization.

3. EXPLAN Theoretical Model

There are many theoretical models for stuttering, among which the EXPLAN model argues that stuttering is caused by a defect in speech planning. According to the EXPLAN theoretical model proposed by Howell and Au-Yeung (2002), speech process includes two independent and simultaneous processes: speech planning process (PLAN) and movement execution process (EX). Speech process: information presentation, then start to PLAN the first word (n), once PLAN(n) is ready, you can start EX(n); EX(n) and PLAN(n+1) are started at the same time. After EX(n) is completed, PLAN(n+1) is ready and can start execution.

Other studies have reached similar conclusions. After the speaker says the first part, the second part is not prepared in time, so it cannot be

seamlessly connected with the first part, resulting in speech interruption (Blackmer & Mitton, 1991). Or, if a simple word is followed by a complex word, the speed of planning and execution of the simple word will be fast, and the next stage of planning will be shorter, but complex words need longer planning time, so there will be a mismatch between planning and execution, and the speech fluency will be impaired (Howell, 2004). Savageh and Howell (2008) argue that this mismatch of planning and execution in stuttering is global and not unique to one language.

The mismatch between speech planning and execution in stutterers has been verified by functional magnetic resonance imaging(fMRI) studies (Lu et al., 2010; Howell, 2010). The study on the speech planning scope for secondary school stutterers support the EXPLAN model (Zhao & Lian, 2021).

4. Speech Planning Scope

The speech planning scope is the amount of information prepared by an individual before pronunciation. The picture naming task covers all stages of speech production. Therefore, the picture naming paradigm is often used when studying speech production, while the picture-word interference paradigm is often used when studying the speech planning scope. This paradigm is classic for the study of speech generation (Meyer, 1996), that is, in the task of image naming, the image is presented accompanied by the interference words. By examining the influence of the semantic and phonetic interference words on the naming task, the planning scope of grammatical coding and phonological coding can be determined.

Allum and Wheeldon (2007) explore spoken sentence production in Japanese and English, and by using different subject phrases, find that the scope of the grammatical coding scheme varies according to the relationship between the two phrases that make up the subject phrase. In the study of spoken Chinese sentence production, researchers have introduced functional phrases that juxtaposed noun phrases and prepositional phrases, and found that functional phrases are the preferred scope of speech planning scope. Moreover, the speech planning scope is flexible and may change due to different experimental conditions (Zhao et al., 2015). Using ERP technology, Zhao and Yang (2016) also found that the scope of the

grammatical coding plan did not include the second noun.

Costa and Caramazza (2002) used the graph-word interference paradigm to explore oral sentence production in English and Spanish and found that the length of phonological coding plan was larger than one phonological word. In addition, Damian and Dumay (2007) explored the planned scope of phonological coding by introducing time pressure into the process of speech production, and found that the planned scope of phonological coding was at least two phonological words and was not affected by time pressure. There are also studies on the use of German subject-verb-object sentence patterns, and through sound interference words (subject-related, object-related and unrelated), it is found that the phonological coding plan is wider than a single syntactic phrase, and may even span the whole simple sentence (Oppermann et al., 2010).

In conclusion, the research has confirmed the stable existence of speech planning scope in the process of speech production, which is universal across languages. At the same time, the study also found that the speech planning scope varies with different language types, task types and age groups, indicating that the speech planning scope is not fixed, but relatively flexible, which provides a logical basis for discussing the defects of speech planning scope of stutterers.

5. Deficiencies in the Speech Planning Scope in Stutterers

Controlling for word frequency, syntactic difficulty, and sound length, the researchers examined the word length effect in stutterers and non-stutterers (word length effect: The longer the word is, the longer the naming latency is), and stutterers are significantly larger than non-stutterers, and stutterers are more sensitive to the complexity of grammatical coding. Even after controlling the pronunciation length, the increase of speech planning will lead to the increase of reaction time, and stutterers have a larger increase. That is, the speech coding of stutterers is defective (Ning et al., 2007). Similar results have been found in studies of stuttering children and high school students; Zhao and Lian (2021) adopted the cyclic semantic region group naming paradigm and found that middle school stutterers also had defects in the scope of grammatical coding plans.

Liu (2019) used eye movement technology to investigate the speech patterns of stutterers and non-stutterers in sentence reading and sentence reading tasks. The results showed that compared with non-stutterers, stutterers had no difference in understanding sentences under the condition of silent reading. In the reading task, the stuttering subjects' eye distance was significantly smaller than that of the non-stuttering subjects, and the error rate was significantly higher. There was no difference in the fixation time of a single word between the stuttering subjects and the non-stuttering subjects, which further indicated that the reason for stuttering was the lack of planning for the next unit (researchers called the distance between the eye gaze and the pronunciation in reading aloud as eye-pitch distance). This study confirms that the speech planning of stutterers is too narrow. Together, these studies have found deficiencies in the scope of the grammatical coding program of stutterers.

People who stutter are bound to have low speech fluency, and the low speech fluency is not necessarily stuttering, and it may not be serious enough to be evaluated as stuttering. However, both stutterers and low speech fluency have great similarities, showing difficulties in speech production. Zhang (2017) used the picture-word interference paradigm to explore the speech planning scope of college students in the high speech fluency group and the low speech fluency group, and found that the speech planning scope of the low speech fluency group was significantly lower than that of the high speech fluency group. The range of grammatical coding plan of the fluency group was the first noun, while that of the low fluency group was smaller than the first noun. Qiao (2019) also found that middle school students with low verbal fluency had significantly lower speech plan scope than high verbal fluency students. In conclusion, the above studies support that individuals with low speech fluency have a smaller scope of phonological coding plans. Although it is not direct evidence, it also supports the defects of the scope of phonological coding plans of stutterers to a certain extent.

6. Summary

Most stuttering in life is developmental and has no obvious physiological defects. Although the incidence of stuttering in children is as high as 5%, many children with stuttering can heal

themselves as they grow up. Even though some children with stuttering will continue to stutter into adults or even old age, the problem of stuttering can be solved after correct and effective methods.

To sum up, no matter in different languages or different stuttering ages, there are defects in the speech planning scope, that is, this defect is universal, indicating that this factor is one of the important causes of stuttering. Therefore, such research results have a good guiding significance for the correction of stuttering. The width of speech plan of stutterers is too small, so adjust the state of mind when speaking, and speak at a slower speed can greatly reduce the frequency of stuttering. Secondly, through speech training, read and speak more to improve the speech expression ability of the stutterer, that is, gradually increase the scope of the speech plan of the stutterer, which can also increase the possibility of fluent speech expression of the stutterer; Finally, this also inspired the stuttering correctors, not only to change the psychological level of stutterers, to break through the psychological barrier can be achieved, but also to improve the speech expression ability of stutterers, so that they have the verbal basis of smooth expression.

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