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Acquisition of Chinese Written Sentence Patterns by
Hearing-Impaired Students Based on Corpus

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Abstract

This paper presents a review of existing research on the Chinese written language corpora for hearing-impaired students and their acquisition of sentence patterns. It discusses the construction of a Chinese written sentence pattern corpus for hearing-impaired students and the procedures and content of research on their acquisition of written sentence patterns. Finally, the significance and value of this study are highlighted.

Keywords

hearing-impaired students, Chinese written language, corpus, sentence patterns, acquisition

The mother tongue of deaf people is sign language. The acquisition of their own language (mainly in written form) and that of hearing people learning a second language fall under the category of second language acquisition. The status, process and results of this acquisition are subject to the second language acquisition mechanism. The proficiency of hearing-impaired students in written language is significantly inferior to that of hearing individuals of a similar age, due to the interference of native sign language and the unfavourable factors encountered in the language environment, namely language input and language transfer. The current state of research on the acquisition of written Chinese by hearing-impaired students is significantly behind the second language acquisition of Chinese by foreign students, with the field still in its infancy. This paper aims to initiate the construction of a corpus of hearing-impaired students' written language and address the issue of hearing-impaired students' written

Chinese sentence acquisition.

1. Research Status

1.1 Status of Chinese Written Language Corpus Construction for Hearing-impaired Students

At present, there is no publicly available Chinese written language corpus for hearing-impaired students in China that researchers can use. Among the papers that have made relatively in-depth discussions on the construction of such corpora, the main ones are Lv (2010) and Yan (2014). The former discusses the corpus attributes and annotation norms of written Chinese corpora for hearing-impaired students, drawing on the experience of constructing interlanguage corpora for foreign students learning Chinese. The latter presents a small written Chinese corpus for hearing-impaired students that she has developed, and its applications.

Current research on Chinese written language acquisition by hearing-impaired students in China (e.g., Liang, 2007; Lv, 2008; Jin, Yan, 2013) is mainly based on self-constructed corpora, with corpus sizes ranging from tens of thousands to several hundred thousand words. In general, manual retrieval is used for statistical analysis, which does not fully exploit the advantages of corpus-based research. Overall, the construction and research of Chinese written language corpora for hearing-impaired students is still in its infancy, and there are few cases of comprehensive annotation of multiple grammatical items in such corpora.

1.2 Status of Research on the Acquisition of Chinese Sentence Patterns by Hearing-impaired Students

In terms of research content, the acquisition of Chinese written sentence patterns by hearing-impaired students has only attracted attention in recent years. Representative works include Zhang (2017), Lu (2018), and Chen (2016; 2020), which cover sentence patterns such as "shi...de" constructions, "shi" constructions, directional verb constructions, and "you" constructions.

In terms of research methods, both experimental paradigms based on task-based testing and empirical paradigms based on corpus analysis have been adopted. The former, represented by Zhang (2017), investigates the developmental characteristics of syntactic awareness in severely hearing-impaired students for "shi...de" constructions. The latter, exemplified by Lu (2018) and Chen (2016; 2020), analyses the types and numbers of errors in "shi" constructions and "you" constructions in hearing-impaired students' written Chinese based on self-constructed corpora, explains the causes of errors, and proposes corresponding teaching strategies. Compared to previous approaches that relied heavily on empirical summaries and limited enumerations, both methods show their respective advantages.

From the point of view of the research findings, the explanations for the acquisition of Chinese written sentence patterns by hearing-impaired students mainly include four aspects:

(1) The influence of native sign language on the acquisition of Chinese written language. This refers to the difficulties arising from the differences between the two linguistic systems. Sign language is a visual-spatial language, while written language is based on an auditory-linear language (spoken

language). Sign language can have a negative impact on the acquisition of written language (Chen, 2020).

(2) The inherent complexity of Chinese as a target language. The Chinese sentence pattern system is vast, with complex syntactic and semantic constraints, which poses significant challenges in second language acquisition. For example, Chen (2016) suggests that the acquisition of Chinese directional verbs by hearing-impaired students is related to the complexity of Chinese grammatical rules, with simple directional complements being acquired better than compound directional complements.

(3) The influence of the linguistic environment, language input and output. Sign language is the first language of deaf people, their most basic form of linguistic communication and their preferred language in both family and social settings. Due to the loss of hearing, deaf people lack crucial auditory language input. The quantity of target language input is limited and its quality is difficult to ensure. In addition, opportunities for language output are scarce. (Lu et al., 2018; Jin & Yan, 2013)

(4) Learners' individual differences. Zhang's (2017) research indicates that there are significant individual differences in the development of written language grammar awareness among hearing-impaired students. Compared to students with mild hearing loss, those with severe hearing loss face more difficulties in developing their grammar awareness of "shi...de" sentences.

Overall, current research on the construction of a Chinese written language corpus for hearing-impaired students and the acquisition of written sentence patterns in China is still in its infancy. The main issues are reflected in the following three aspects:

(1) From a theoretical point of view, most studies lack the guidance of linguistic theory and second language acquisition theory. Except for the research conducted by scholars such as Zhang Fan, Liang Dandan, Jin Huiyuan and Chen Ke, other studies rarely apply second language acquisition theory. In addition, some studies lack adequate generalisation in their grammatical analysis of various error patterns of hearing-impaired students.

(2) In terms of research methods, most studies rely on empirical inductive research and lack the support of large corpora. Corpus sizes range from tens of thousands to hundreds of thousands of words, and the corpus used for analysis ranges from tens to hundreds of entries. This affects the objectivity, stability and universality of the conclusions drawn.

(3) In terms of research objects, studies on the acquisition of Chinese written language by hearing-impaired students include various aspects, such as parts of speech, sentence components, word order, negation structures and special sentence patterns, which lack systematisation. The Chinese sentence pattern system occupies a special place in Chinese grammar and has always been considered a difficult and important aspect of grammar research and second language teaching. Research on foreign students' acquisition of Chinese sentence patterns has always been a hot topic in second language acquisition studies, and rich research results have been achieved. At present, the acquisition of written sentence patterns by hearing-impaired students involves only a limited number of patterns. As a system, the study of Chinese sentence patterns needs to be expanded and deepened.

2. Construction of a Corpus of Chinese Written Sentence Patterns for Hearing-impaired Students

The corpus-based research method is a linguistic approach that "reveals the probabilistic features of language use through large-scale authentic language materials, thereby answering linguistic ontological questions or guiding language teaching practices" (Xu, 2019). Significant progress has been made in the construction of both Chinese native speaker corpora and Chinese as a second language learner corpora, which have produced a wealth of research findings. The acquisition of Chinese by hearing-impaired students also falls within the scope of second language acquisition. Based on the achievements in the construction of Chinese as a second language learner corpora (Xiao & Zhou, 2014), we can proceed with the development of a corpus of Chinese written sentence patterns specifically for hearing-impaired students.

(1) Corpus collection and organisation. Following the principles of authenticity, comprehensiveness and balance, we have collected over 400 pieces of composition written by hearing-impaired students from the fourth year of primary school to the third year of high school from several cooperating special schools. Currently, we have completed the computer input of some of the corpora, with a corpus size of 84,000 words. The corpus is being continuously expanded, with a target size of 500,000 words. Detailed annotations have been made on corpus attributes, including corpus author number, gender, age, degree of hearing loss, age of deafness, oral rehabilitation status, sign language use, school, grade, corpus genre, etc. In addition, the corpus was proofread and processed for word segmentation.

(2) Determining the sentence pattern system and designing the annotation set. Based on our research objectives, combined with the characteristics of Chinese grammar and the grammar system of teaching Chinese as a foreign language, this project divides the Chinese sentence pattern system into two main categories. The first category is special marked sentences (coded with a B prefix), including six types: 'you' sentences (BYZ), 'shi' sentences (BSZ), 'ba' sentences (BBZ), 'bi' sentences (BBS), 'shi...de' sentences (BSD) and 'lian' sentences (BLZ). The second category is special sentence patterns without markers or with unfixed markers (coded with a P prefix), including ten types: existential sentences (PCX), serial verb sentences (PLD), pivotal sentences (PJY), double object sentences (PSB), causative sentences (PSD), verb-copying sentences (PCD), unmarked passive sentences (PBW), marked passive sentences (PBB), "gen/he/tong. (yiyang)" sentences (PBG) and compressed sentences (PJS). The corpus is annotated with both correct examples (represented by three letters) and error examples. Error examples are represented in the form of "error type + sentence pattern marker" with four letters. The error types are divided into five categories based on their surface form: redundancy (R), omission (Y), substitution (T), out-of-order(O) and mixing (Z).

(3) Development and application of retrieval software. This project has developed retrieval software specifically for Written Chinese sentence pattern system of hearing-impaired students, which can exhaustively search for both correct and incorrect usage examples of various sentence patterns. The software allows the flexible use of wildcards (such as "*" and "?") to retrieve the occurrence of specific

error types or all error types within a particular sentence pattern.

3. Acquisition Research on the Sentence Pattern System of Hearing-impaired Students' Written Chinese

Based on a large corpus of hearing-impaired students' written Chinese, this study investigates the acquisition status and process of hearing-impaired students' written sentence patterns. It conducts error evaluation and interpretation, and explores the difficulty levels and acquisition sequences. It also explores the acquisition mechanism of hearing-impaired students' written sentence patterns from various perspectives, including negative transfer of mother tongue, language typology and markedness, generalisation of target language rules, and input frequency. The research findings will be applied to the acquisition and teaching of hearing-impaired students' written Chinese, with the aim of improving their acquisition efficiency and enhancing their written Chinese proficiency.

3.1 Acquisition Analysis of Written Sentence Pattern System Among Hearing-impaired Students

This study explores what hearing-impaired students have acquired and what they have not yet acquired in terms of various sentence patterns. It investigates the process of acquisition, the relationship between their language system and their native language (sign language) and target language (Chinese), the difficulties encountered during acquisition, as well as the acquisition order and difficulty level. The specific research contents include:

- (1) Performance analysis and acquisition process research. This study tallies the usage rate and correct usage rate of various sentence patterns and their subcategories, examines the usage among students with different levels of Chinese proficiency, and discovers their longitudinal dynamic development process by "splicing" different cross-sections. It also calculates the frequency of sentence patterns used in the composition corpus of primary and secondary school students (hearing individuals) and compares the differences in usage between the interlanguage of hearing-impaired students and their hearing peers. The aim of this section is to investigate the dynamic developmental process of hearing-impaired students' written interlanguage as it approaches the target language from their mother tongue (sign language).
- (2) Error type analysis, cause explanation and error evaluation. This part of the study counts the cases of erroneous sentence patterns and their subcategories, analyses the types of errors, counts the number and proportion of different types of errors, and analyses the characteristics of these errors. It explains the causes of errors in terms of mother tongue transfer (the influence of sign language), target language generalisation, learning and cognitive strategies. The severity of errors is assessed on the basis of factors such as frequency and duration.
- (3) Research on level of difficulty and order of acquisition. By combining data on the acquisition process of different sentence patterns, error rate, correct usage rate and first appearance rate, this study uses the implicational scaling method to determine the acquisition order of written sentence patterns among hearing-impaired students.

3.2 Exploring the Mechanism of Written Language Acquisition for Hearing-impaired Students

Combining the sentence pattern annotation information from the hearing-impaired students' Chinese Written Sentence Corpus, this study applies relevant theories of second language acquisition (including contrastive analysis, error analysis, interlanguage theory, acquisition order analysis and performance analysis) to test specific hypotheses or predictions of interlanguage and explore the acquisition mechanism of Chinese sentence patterns for hearing-impaired students. Specific research topics include:

- (1) Negative transfer mechanism of the mother tongue: Currently, most explanations for the status of written language acquisition by hearing-impaired students attribute it to the influence of sign language on Chinese, such as word order transfer, lack of quantifiers, and lack of information about action modes or paths. However, further research is needed to determine the extent to which sign language affects the development of written Chinese, which errors are most related to the influence of sign language, and whether there are any positive effects.
- (2) Language typology and the mechanism of marking: Some existing studies suggest that the acquisition of written language by hearing-impaired students is influenced by the differences between sign language and written language, and the greater the difference, the more difficult the acquisition (Chen, 2016; 2020). From the perspective of the markedness theory of language acquisition, such views may have problems. Therefore, it is necessary to explore the restrictive mechanism of language markedness on the acquisition of written language by hearing-impaired students in the context of language typology.
- (3) Generalisation mechanism of target language rules: According to second language acquisition theory, there is a boundary effect of native language influence on interlanguage development, and the basic cause of interlanguage errors is the learner's insufficient grasp of target language rules. Therefore, this study will focus on exploring the role and mechanism of syntactic, semantic and pragmatic factors of the target language in the acquisition of written sentence patterns by hearing-impaired students.
- (4) Input frequency mechanism: This involves examining the effect of frequency factors on the order and process of acquisition. Frequency factors include both the frequency of use of the form in sign language and in the target language.
- (5) Avoidance mechanism: Some researchers have pointed out the need to "seek for lost written language of the deaf" (Wu, 2006). Hearing-impaired students tend to use certain grammatical items less frequently, showing a noticeable "avoidance" phenomenon. The reasons for this "avoidance" could be due to the absence of relevant categories in their native language (sign language), the high cognitive difficulty of related categories in the target language (Written Chinese), or a specific communication strategy. Studying the avoidance mechanism is conducive to deepening the understanding of cognitive psychology in the second language acquisition process of hearing-impaired students.

3.3 Teaching Reference and Inspiration

Based on the detailed description and analysis of the acquisition status and patterns of hearing-impaired students' written Chinese sentence structures, the results of this study ultimately aim at the acquisition and teaching of written language for hearing-impaired students. The main aim is to help hearing-impaired students to increase the relevance of their learning, improve their learning efficiency and promote the development of their written language skills. Simultaneously, this study provides first-hand information and relevant teaching strategies and suggestions for teachers and researchers involved in special education, serving as a reference for textbook writing, curriculum design, classroom teaching, assessment and more.

4. Conclusion

Currently, Zhejiang is vigorously promoting the evaluation of standardized special schools. As of January 2024, there are 71 standardized special schools in Zhejiang Province. Zhejiang leads the country in improving the conditions and quality of special education schools. Based on the collection and organization of written language materials from hearing-impaired students in various special schools in Zhejiang, this study has developed a sentence corpus and conducted research on sentence acquisition, which holds high theoretical and practical value.

Firstly, the theories and methods of second language acquisition research adopted in this study, combined with empirical research methods that integrate quantitative and qualitative analysis based on a large amount of natural language data, serve as a valuable reference for studying the acquisition of other language items in hearing-impaired students' written language.

Secondly, the corpus of Chinese written sentences for hearing-impaired students developed in this study can be networked and accessed online when conditions are ripe at a later stage, providing corpus resources and fundamental support for the acquisition and teaching research of hearing-impaired students' written language.

Thirdly, this study helps to deepen the understanding of the acquisition process and mechanism of hearing-impaired students' written Chinese sentence system, promotes the improvement of hearing-impaired students' written language ability and communication skills, helps them to better integrate into society, realise their personal value, promote social progress and contribute to common prosperity.

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