

Review on Pragmatic Development of Children With Neurodevelopmental Disorders

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This paper offers a CiteSpace-based systemic review on pragmatic development of children with neurodevelopmental disorders during 2003-2023, based on data from domestic CNKI papers of core journals and qualified master and doctoral dissertations and web of science core collection. The literature shows that most of the studies on the development of children with neurodevelopmental disorders have focused on communication behaviors, conversational skills, and narration, and most of the materials come from parent-child interactions. The subjects of the study were mainly focused on pre-school children and the research scope was not comprehensive enough. This study proposes a new perspective of developmental pragmatics combined with experimental pragmatics. Experimental pragmatics provides a new way to study the pragmatics of children with neurodevelopmental disorders, combining the characteristics of different languages and providing a theoretical basis and practical foundation for designing better intervention treatment programs.

Keywords: children, neurodevelopmental disorders, pragmatics, language

Introduction

Children's pragmatic development involves pragmatics, child psychology, social interaction and features how children use appropriate forms of speech according to contexts to achieve communicative purposes. Literature research shows that a little is known to innovations in domestic and international studies on the pragmatic development of children with neurodevelopmental disorders, and intervention studies on the pragmatic development of such children still have more room for growth. On the one hand, most of the domestic studies stay at the level of phonology, vocabulary, syntax, and semantics, which are mainly about input ability, such as dyslexia and dyscalculia. The research subjects are mainly preschool children with autism and other neurodevelopmental disorders, and fewer studies are on the language development of post-school children. Foreign studies, on the other hand, show multi-perspectives and multi-dimensional characteristics, mainly focusing on language acquisition, conversational skills, social skills, pragmatic failure, cognitive behavior of preschool children with neurodevelopmental disorders. More studies on output ability have been conducted on children with autism, Down's syndrome, spectrum disorders, and other types of neurodevelopmental disorders. It is argued that in understanding the challenges that children with neurodevelopmental disorders face in communicating with others, it is important to focus on the pragmatic ability of such children to make

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meaningful and appropriate pragmatic choices in dealing with social relationships beyond the scope of psychiatry, pediatrics, and psychology. Bachman (1990, p. 98) has defined pragmatic competence as “the ability to express, in context, the knowledge used in socially appropriate performative behavior during discourse communication”, which suggests that pragmatic competence has two aspects, i.e., knowledge of language and use of language, involving social, cultural, and contextual factors. Since children with neurodevelopmental disorders may be differently impaired in their pragmatic abilities, which may lead to difficulties in education and socialization, research on the development of pragmatic abilities in these children is essential to understand their pragmatic abilities, design appropriate therapeutic and training programs, and promote their physical and mental health development. Therefore, this study will provide a systematic review of domestic and international research on the pragmatics of children with neurodevelopmental disorders in the past two decades, and provide thoughts for related theoretical research and intervention studies in China.

This paper is based on data from domestic CNKI papers of core journals and qualified master and doctoral dissertations and web of science core databases to explore the hotspots and research trends of these disabled children’s pragmatic development at home and abroad, with “children with disorders” and “language”, “Children with disorders”, and “pragmatic” as the search terms respectively. The search was conducted on April 15, 2023, with the span of 20 years. After effective exclusion of the data, 762 Chinese literatures and 1,092 English literatures were selected as the valid data. 6.2.R1 (64-bit) basic version of CiteSpace software was used, with keyword selected for node, Top 50 selected for threshold, Time Slice of one year, and pathfinder and pruning sliced networks. The rest of the parameters were selected by default.

Research Hotspot Visualization Mapping Analysis

CiteSpace can use bibliometric methods to analyze the co-occurrence frequency, cluster relationship analysis, and calculate the keyword centrality of the keywords of the related literature in a certain field, and show the current status of the research in this field through the mapping.

CiteSpace has shown that a network based on high-frequency keywords of China is formed about “speech delay, children, language training”. Other high-frequency keywords include “autism, autistic disorder, language, picture book reading, hearing impairment, dysarthria, syntax”, which indicates to some extent that domestic research on the language development of such children from 2003 to 2023 has focused on the areas of phonology, vocabulary, syntax, and semantics. Research abroad has formed a high-frequency keyword network on “children, pragmatic language, skills”, while other high-frequency keywords include “language impairment, comprehension, communication”. This indicates that in the past 20 years, foreign scholars have paid close attention to the field of pragmatic development of these disabled children, including verbal behaviors, conversational skills.

The dynamic keywords of the strongest citation burst in domestic and international research on such children’s pragmatic development in the past two decades, as summarized by CiteSpace, are in Table 1. The CiteSpace can use mutation detection algorithms to extract terms with sudden and dramatic increases in keywords from related literature to track the dynamic changes of research in a certain period of time. According to Table 1, it can be seen that the keywords of the strongest citation burst of such children’s pragmatic research at home are often accompanied by the characteristics of the language, language ability of a certain aspect of the disorder, such as pronunciation, vocabulary, narrative disorders, etc. Statistically, the total strength of citation burst in research on language disorders is 19.89. In addition, the advancement of medical science and

technology has led to many intervention studies, such as “early intervention, speech therapy, language training”, etc., in which the strength of “language training” is 2.50. Thus, domestic research still focuses on the level of phonology, vocabulary, and syntax, and little research has been done in pragmatics. In contrast, such research abroad often focuses on conversational, expressive, executive, and pragmatic disorders, with strength of 4.86 for “developmental language disorder”. Furthermore, foreign scholars have noticed the influence of context on the pragmatic development of these children, and explored various possibilities of intervention research from parent-child interaction, e.g., the strength of “parent” is 4.44. However, the characteristics of Chinese and English are different and cultures they contain are different, so it is not possible to completely copy the results of foreign research to verify the domestic research. It is of great value to understand the different linguistic characteristics of these disabled children for the guidance and application of actual teaching and training.

Table 1

Keywords of the Strongest Citation Burst of Language of Children With Neurodevelopmental Disorders (2003-2023)

Keywords	Strength	Begin	End	Keywords	Strength	Begin	End
早期干预	2.35	2003	2007	Childhood	4.2	2004	2010
言语障碍	2.21	2003	2007	Discourse	3.98	2008	2017
语言疗法	1.66	2003	2007	Disorders	5.09	2010	2011
学习障碍	1.55	2003	2006	Specific language impairment	3.7	2011	2018
脑瘫	3.03	2005	2013	Diagnostic/observation schedule	5.03	2012	2013
儿童语言	2.41	2006	2012	Parent	4.44	2012	2014

Results

By categorizing and analyzing the keywords, it is found that domestic and international studies on language use of children with neurodevelopmental disorders mainly include the following three aspects.

Passivity in Communication Behavior

Communication behavior involves both verbal and non-verbal communication behaviors. In a certain context, the implementation of promises, warnings, threats, requests, commands, and other similar functional words is called “verbal behavior”, while in order to achieve the needs of communication to show the body movements, facial expressions are called “non-verbal communication behavior”. Children with neurodevelopmental disorders tend to use nonverbal behaviors to compensate for the lack of verbal ability in the early stage of interaction with peers, teachers, and family members to achieve communicative purposes. Later verbal behaviors are more passive in comprehension and expression and show retardation compared to typically developing (TD) children, but with the development of intellectual age and the enrichment of social experience, verbal behaviors in their communicative behaviors will gradually progress. Jiang Minhong (2006) used the CLAN, with the discourse of children with Down syndrome communicating with their parents in semi-structured situations, to illustrate that the children’s non-verbal behavior promotes successful communication, and argued that such children remained passive and submissive in communicating with their parents. Shumway and Wetherby (2009) used a systematic observational approach to analyze communication behavior video samples of children with Autism Spectrum Disorder (ASD), addressing core deficits in communication speed, joint attention, and communication gestures compared to TD children at the age of two. Braddock et al. (2013) employed an IPCA

to categorize potential communication behaviors and discuss potential communication behaviors in 17 children with ASD, who they identified as using more types of gestures to compensate for verbal comprehension and expression, and nonverbal thinking.

On the whole, research on the communication behavior of children with neurodevelopmental disorders at home and abroad has mainly focused on corpus in specific contexts, such as that produced by parental interactions, and the type of corpus chosen is homogeneous. One obvious flaw in the corpus of parental interaction is that adults show special care for children, especially vulnerable children. As a result, language also spontaneously shows care for the disadvantaged, leading to unrealistic and incomplete studies of the pragmatic development of such children. Research methods do not adopt a systematic research system, and a few of them adopt a combination of qualitative and quantitative research methods, which are mostly confined to the theoretical level, with few empirical studies. Scholars at home and abroad have gradually begun to conduct systematic research on pragmatic development from different contexts, communication modes, and communication objects, exploring the characteristics of communication behaviors of children with neurodevelopmental disorders, so as to enable people to have a more systematic understanding of the communication behaviors of children with neurodevelopmental disorders, and to provide a large number of theoretical guides for their rehabilitation and education.

Deficiency in Conversational Skills

Conversational skills are the main competencies embodied in children's pragmatic behavior and affect their overall language learning and development. Specifically, conversation is the exchange of spoken information in the process of interpersonal communication and is a common form of communication in daily life. A speaker initiates a conversation until the end of the conversation is called a turn, and when he or she changes from a speaker to a hearer, the turn is completed. The continuous transition of the turn is the basis of a complete conversation, which is also the most significant formal feature of conversation. Conversation initiation is the verbal behavior of the speaker to start a topic, and conversation maintenance and repair is the hearer's response behavior to the topic of conversation and information supplementation or modification. However, children with neurodevelopmental disorders are relatively weak in conversation initiation and maintenance, turn-taking, conversational repair, and conversational integration, and exhibit poor expressive skills, insufficient comprehension, and poor language quality, highly influenced by contextual factors. Feng Chen (2017) adopted a quantitative research method, combined with qualitative analysis of mother-child conversational data, with children with mild autism as the research object, through a comparative study with ordinary children with matching vocabulary levels, and found that children with autism have slow response during conversation, monotonous words, difficulty in applying language, difficulty in initiating and maintaining conversation, and lack of rules of the turn of the word. Broeders, Geurts, and Jennekens-Schinkel (2010) examined the language structure and language use of children with epilepsy using the Children's Communication Checklist (CCC) and demonstrated that children with epilepsy have communication deficits, i.e., limited vocabulary, brief discourse, simplified grammatical structures, and a limited variety of grammatical structures.

In summary, research on the conversational skills of children with neurodevelopmental disorders at home and abroad had demonstrated deficient, and most of them used questionnaires to examine specific conversational skills in parent-child interactions, which still remained at the level of theory. The methodology of the study is similar to that of TD children's conversational studies, which basically follows a classical

research paradigm: explaining children's conversational skills through turn-taking, conversation maintenance and initiation, and conversation repair.

Although a series of results have been achieved in the study of these disabled children's conversational skill, this kind of research deserves further exploration.

Frustration in Narrative Ability

Narrative is a form of linguistic expression out of context, through which the speaker expresses his or her own experiences, speaks sequentially about previously unordered and unconnected events according to his or her own particular point of view, and expresses or understands a topic logically and coherently. Research on the pragmatic development of children with neurodevelopmental disorders has shown that these disabled children's narrative skills in terms of the structure of narratives feature poor narrative coherence, unclear causal connections, shortened narratives, impoverished language, and reduced syntax. In terms of linguistic features, they are characterized by phonological monotony, unclear and incoherent discourse expression, and flawed narrative processes. By observing the linguistic phenomenon of autistic children in education, Yang Xijie (2008) found that their narratives were often logically confused and off-topic. In addition, Paul, Augustyn, Klin, and Volkmar (2005) proved that autistic children's dysrhythmia in narratives is due to their own defective perception of rhyme. At the same time, the body of content produced by such children during narrative is rather vague (Rumpf, Kamp-Becker, Becker, & Kauschke, 2012) and tenses are mixed up (Zhou et al., 2014). By examining the narrative discourse of children with high-functioning autism, Sah and Torng (2015) found that they seldom establish causal connections during the narrative process, resulting in weak narrative coherence. In addition to the above characteristics, children with neurodevelopmental disorders are less likely to produce words and phrases that are cognitive and express emotional feelings or judgments, and some are even unable to use empathy or other nonverbal strategies to maintain the attention of others (Brown & Klein, 2011; Baron-Cohen, 2010).

To summarize, studies on the narratives of children with neurodevelopmental disorders in China and abroad have made considerable achievements, but the narrative characteristics of such children have not been comprehensively and consistently characterized, especially with regard to the portrayal of the linguistic dimensions of the narratives, which is closely related to the research design and methodology.

Prospects and Directions for Research on Pragmatic Development in Children With Neurodevelopmental Disorders

In conclusion, the research on the pragmatic development of children with neurodevelopmental disorders at home and abroad has shown a trend of multiple perspectives. The shortcomings are mainly that the assessment methods are not comprehensive and systematic, the empirical studies are not deep enough and mostly stay at the theoretical level, and the intervention practices are insufficient.

Current research at home and abroad mainly focuses on the areas of communication behavior, conversational skills, and narrative ability. The research on communication behavior focuses on the parent-child interaction and mostly preschool children, which is relatively single and limited. The characteristics of such children's communication behaviors are categorized as passive. In terms of conversational skills, the research paradigm follows the classical research paradigm, using qualitative analysis. Few consistent conclusions have been drawn. Overall, current research methods are mostly qualitative, centered around pre-school children and typical

contexts, such as mother-child interaction, or semi-structured interviews. The corpus is limited and lacks comprehensive and objective analysis, ignoring the child-child mode of conversation, and most of the studies stay at the theoretical level or one-sided linguistic phenomena, such as syntax, phonology, conversational skills, and narrative competence. Although there are some norm-referenced assessment tools, such as the Pragmatic Ability Questionnaire (PAQ), they are not well developed and have not been uniformly certified. It can be seen that though research on the pragmatic ability of children with neurodevelopmental disorders has made great progress, there are still some areas that deserve in-depth research and exploration, such as the pragmatic behavior of children with neurodevelopmental disorders in school-age, communication behavior with peers, and the need to consider factors, such as gender, age, and social background when designing intervention methods. In addition, studies have shown that the domestic research on language disorders in mentally retarded children is not as systematic and comprehensive as the foreign research, but the domestic research cannot directly copy the foreign research because the cultural factors behind the design of the language are different.

Therefore, the pragmatic development of children with neurodevelopmental disorders should focus on the measurement, assessment, and intervention of such children's pragmatic abilities. First of all, the influence of contextual factors cannot be ignored, and most of the research results in the last two decades at home and abroad are based on some specific contexts, such as mother-child dialogues, semi-structured interactions, etc. However, in normal life, children's communication objects and modes of communication are far more than these types, and they are dynamically evolving, so whether the expressive abilities of such children show different characteristics in different contexts and whether there is a connection between these characteristics are worth exploring in depth. Secondly, the assessment tools of pragmatic competence are not accurate and comprehensive enough. Most of the existing studies have used questionnaires to analyze the corpus through the "CLAN", etc. However, the syntax and pragmatics of each language are different, so it is not possible to use the same method to adapt to two completely different languages, so the measurement tools of Chinese pragmatic competence cannot be completely copied from the foreign assessment tools. The correct assessment tools need to be found suitably for this kind of special children, such as eye movement experiments or electroencephalography experiments to measure the language proficiency of neuro-developmentally impaired children in a scientific way. Finally, domestic intervention can learn from foreign intervention research results according to its own characteristics so as to design treatment programs suitable for Chinese children.

Conclusion

This paper utilizes CiteSpace to sort out the research on the pragmatic ability of children with neurodevelopmental disorders at home and abroad in the past two decades. It is found that the current research focuses on preschool children, in addition, the corpus source is relatively single, the assessment tool is not accurate enough, and the research method is mostly qualitative analysis, lacking experimental data support. This paper proposes that developmental pragmatics should be combined with experimental pragmatics to study the pragmatic ability of children with neurodevelopmental disorders by using electroencephalography (EEG) or eye-movement (EMA) experiments, e.g., EEG can be used as a diagnostic aid for children with neurodevelopmental disorders. In addition, eye movement technology allows subjects to process more "naturally" during the experiment, which can provide researchers with more experimental data on real-time language processing, such as quantifying reading behavior. Such a study would avoid the problems of fragmentation and subjectivity of qualitative studies. Grasping the characteristics of language development in

children with different neurodevelopmental disorders can help design appropriate intervention programs, which can provide an effective theoretical basis and practical support for the rehabilitation of these children.

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