Original Article

Characteristics of metaphor and reasoning comprehension ability of school-aged children with language development delay

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Purpose: This study compares the degree of metaphor and reasoning comprehension development of three groups by evaluating the metaphor and reasoning comprehension of children with language development delay, children with matching language age, and children with matching chronological age.

Methods: The subjects of the study were 15 children with delayed language development, 15 children with matching chronological age, and 15 children with matching language age. In order to find out their understanding of metaphors and reasoning, the test was conducted by presenting a stimulus plan with three stimulation pictures on one panel in which a subject selects a corresponding picture from the three pictures according to the inspector's verbal instruction. The test consists of 70 questions, and the stimulus picture of metaphor and reasoning comprehension consists of figurative, dictionary, and inappropriate content.

Results: Metaphor and reasoning comprehension was tested with the contents of metaphor ability based on substantive objects and metaphor ability based on abstract objects, with the following results. First, there was a significant difference between these groups as a result of comparing the development of metaphor and reasoning comprehension of children with delayed language development, children with matching language age, and children with matching chronological age. Second, there was no difference in metaphor and inference comprehension between the children's group with language development delay and the children's group with matching chronological age as they both showed high performance and their metaphor and inference comprehension was homogeneous. Third, as a result of comparing the metaphorical abilities of the children's group with language development delay and the other children's groups, it was found that an intervention program is needed to improve the metaphor and reasoning comprehension of children with language development delay. In particular, it is necessary to develop an arbitration method, which focuses on conceptualizing light abstract ideas, to improve their metaphor and reasoning comprehension.

Conclusions: Based on this result, systematic intervention according to the degree of development of metaphor and reasoning ability is necessary to improve the social communication ability of children with delayed language development.

Keywords: Metaphor and reasoning comprehension ability, Metaphor, Reasoning, MARC, Language development delay, Language development disorder

INTRODUCTION

Both verbal and nonverbal expressions are essential for smooth communication with

others. In particular, upper language skills such as metaphors and figures of speech, which must be extrapolated to understand the direct language, are fundamental components of social communication. This meta-language element is vital for learning and smooth peer relationship formation for school-aged children and must be developed.

Children with language development delays struggle with direct language understanding and expression and meta-language skills such as metaphors and figurative language [1]. According to previous studies on metaphorical capabilities, several researchers [2-6] said that problems with metaphor and reasoning communication appear complex, while Lim [7], Kim [8], Shin [9] said that it is full of language implications. Figurative language is a language of abstract meaning rather than a dictionary meaning and consists of metaphors, idioms, and proverbs; among them, metaphors are chiefly used [5].

A metaphor is associated with reasoning ability and can represent jokes, indirect expressions, and figurative connotations. Moreover, recognizing it must be developed to understand the meaning of a conversation partner's language, which is deeply related to practical aspects [1,5]. Many studies show that these metaphor and reasoning abilities develop from infancy to adolescence, and no studies have been conducted on the specific stage of which area of development the metaphorical abilities begin. Currently, standardized test data for each age on school-age metaphor and reasoning comprehension are being studied [10]. In the case of children with delayed language development in school age, specific research is necessary on whether their metaphor comprehension and reasoning skills are developing or developing similarly to ordinary children.

Therefore, this study aims to compare the metaphor and reasoning comprehension skills of children with delayed language development, children with the same language age, and children with the same chronological age to determine the developmental characteristics of each group's metaphor and reasoning comprehension skills.

METHODS

Subject
The subjects of the study were 15 children with delayed language development, 15 children with matching language age, and 15 children with matching chronological age. The selection of the research subject shows a pattern of self-centered communication when the school age of [11] children with

Table 1. Participant characteristics

Group	N	Age (SD) (unit: mons)
Language development delay	15	126.80 (10.78)
Matched language age	15	88.80 (9.42)[1]
Matched chronological age	15	127.27 (11.71)

[1]REVT-R: Receptive and Expressive Vocabulary Test (REVT; Kim et al., 2009).

language development delays are 7 years or older. Children with matching language age and children with matching chronological age were likewise considered, and a total of 45 people were selected. The language age was selected based on the results from the Receptive and Expressive Vocational Test [12].

The average age of the language development delayed children group was 126.80 months, and the average language age was 97.13 months. The average age of the children with matching language age was 88.80 months, with the average language age being 104.93 months. Finally, the average age of the children with matching chronological age was 127.27 months.

Children with language development delays were defined as children with -2SD or less as a result of the REVT-R test, ordinary children with -1SD or more, and children with physical, emotional, and hearing problems as reported by parents or teachers. The characteristics of the research subjects by group are shown in Table 1 below.

Research tool
In this study, the Metaphor and Reasoning Compensation Test [10] was used to ascertain the study subjects' metaphor and reasoning ability. Metaphor and reasoning questions in this test consist of conceptual and verbal metaphors, and the metaphors require contextual identification, personification, and idioms. Meanwhile, the degree and difficulty of metaphors consist of low metaphors, ordinary metaphors, and complex metaphors [4,6,10].

The MARC test is a standardized tool to evaluate and diagnose the metaphor and reasoning comprehension of school-aged children, to confirm their degree of metaphor and reasoning comprehension development, and to promote their advancement.

Metaphor and reasoning ability was decided with the children pointing out the correct answer among the pictures presented in the stimulus book, which referenced previous studies [13]. This method of choosing from the presented ques-

tions or pictures is more reliable than explaining one's choice. The test consists of 70 questions and for each question, three pictures are presented on one stimulus plate to exclude random selection. When the examiner verbally renders the presentation, the examinee selects one corresponding picture from the three presented pictures.

Research procedures and analysis methods

The test was delivered 1:1 in a quiet laboratory where the examiner and the child were quiet. First, the REVT-R test [12] was administered to confirm whether it was suitable for this study, and then the MARC test, a standardized test for metaphor and reasoning comprehension, was conducted [10].

In the metaphor and reasoning comprehension test, the examiner made the child fully understand the test through the exercise questions and then conducted all 70 tests while facing each other.

The children responded positively by giving 1 point, and the sum of the responded questions was calculated as the original score, with the total items being 70 points.

Data processing

One-way ANOVA and Scheffe post-test were utilized to compare the differences on the metaphor and reasoning comprehension of children who matched their language development age, children with delayed language development, and children with matching chronological age. Statistical processing of data was performed using SPSS 27.0.

RESULTS

This study analyzed the metaphor and inference comprehension characteristics of children who matched their language development age and children with language development delay. Based on the results, the metaphor and reasoning comprehension characteristics of children with language development delay were discussed.

Metaphor and reasoning comprehension among the three

groups was found to be 30.07 points for children with language development delay (15 people), 33.33 points for children with matching language age (15 people), and 53.40 points for children with matching chronological age (15 people), as shown in Table 2.

The result of variance analysis to find out the difference in metaphor and reasoning comprehension between the three groups showed a significant difference between the three groups ($p < 0.001$, $F_{(2, 44)} = 40.005$).

Based on the post-test, the average difference between the children's group with delayed language development and the children's group with matching language age was 3.27 points, so there was no significant difference in metaphor and reasoning comprehension between these groups.

The average difference between the children's group with language development delay and the children's group with matching chronological age was 23.33 points, showing a significant difference in metaphor and reasoning comprehension ($p < 0.001$).

In addition, there was a significant average difference of 20.07 points between the children's group with matching language age and the children's group with matching chronological age ($p < 0.001$) (Table 3).

As a result of the 3rd group's metaphor and reasoning comprehension test, there was no difference in the metaphor and reasoning comprehension scores between the language development-delayed group and the group that matched the language development-delayed children's age (Table 4).

Table 3. ANOVA results on metaphor and Reasoning comprehension

	df	SS	MS	F
Between the groups	2	4,788.933	2,394.467	40.005*
Within the group	42	2,513.867	59.854	
Total	44	7,302.800		

*$p < 0.001$.

Table 4. Homogeneity test for the mean difference between groups

	Children with language development delay	Children with matching language age
Children with language development delay	30.07	
Children with matching language age	33.33	
Children with matching chronological age		53.40

Table 2. Groups' metaphor and reasoning comprehension test raw score

Group	N	MARC	
		Raw score	SD
Children with language development delay	15	30.07	6.66
Children with matching language age	15	33.33	9.49
Children with matching chronological age	15	53.40	6.72

DISCUSSION

This study examined the differences between children who matched their language age and children who matched their chronological age to find out the metaphor and reasoning comprehension patterns of children with delayed language development at school age.

Looking at the form of answers to metaphors and reasoning comprehension of school-aged children, the younger the age of language development, the more literally they answered. In the case of children with language development retardation in the early school age, they showed a pattern of answering the object in a visible shape or form, and it was difficult for them to answer with metaphorical function, metaphorical reasoning, and emotional concepts. It was found that the results were similar to previous studies that provided inappropriate answers when learning or experience in metaphors and reasoning was insufficient [1,14]. In addition, the third group's metaphor and inference comprehension scores in the MARC test were similar to the standardized, average score.

The metaphor does not directly express what you want to convey but figuratively conveys the meaning you want to share with another person [1,15]. Metaphors and reasoning belong to a high-level metalanguage, and children with delayed language development have more delayed development of metaphor and reasoning comprehension than ordinary children, showing a similar level to ordinary children who matched their language age. In addition, the metaphor and reasoning development patterns of children with delayed language development are based on their language development age. It can be said that this does not represent developmental deviation compared to other language development areas in metaphor and reasoning ability but shows a delay in development. According to a study by Kwak et al. [3], Hong and Yim [15] which examined the degree of metaphor assignment for children with simple language disabilities and children in general, children with a low level of metaphorical intelligence were less experienced than children 7 to 8 years of age. In a study of children aged 4 and 5, Lee and Seok [1] found that children with language development delay find more difficulty in understanding hidden meanings, especially ideas with emotional expressions and abstract concepts, compared to ordinary children.

This study examines whether there is a difference in the development of metaphor and reasoning comprehension between the children's group with language development delay, the children's group with matching language age, and the children's group with matching life age. The results are as follows.

First, there was a significant difference between these groups as a result of comparing the development of metaphor and reasoning comprehension of children with delayed language development, the children's group with matching language age, and the children's group with matching chronological age.

Second, there was no significant difference in metaphor and reasoning comprehension between the children's group with language development delay and the children's group with matching chronological age as they both showed high performance, and their metaphor and reasoning comprehension was homogeneous.

Third, as a result of comparing the metaphorical abilities of the children with language development retardation and the other children's groups, it was found that an intervention program is needed to improve the metaphor and reasoning comprehension of children with language development delay. In particular, it is necessary to develop an arbitration method, which focuses on conceptualizing light abstract ideas, to improve their metaphor and reasoning comprehension.

Based on this result, systematic intervention according to the degree of development of metaphor and reasoning ability is necessary to improve the social communication ability of children with delayed language development.

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