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RESEARCH ARTICLE

A comparative study of metaphorical expression understanding between children with cochlear implants and normal children

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Abstract

Background and Aim: Understanding abstract concepts, especially metaphors in daily life and education is a complex conceptual phenomenon. Early hearing damages can affect an individual's understanding of metaphors and their functions in different ways. This study aimed to compare the understanding levels of metaphorical expressions between children with cochlear implants (CIs) and normal children.

Methods: In this study, 35 children with CIs were compared with 35 normal children in terms of understanding metaphorical expressions. Two groups were matched in terms of gender and age. The children with hearing problems received their implants when they were two to five years old. Both groups of children were evaluated using a researcher-made test. Finally, the data collected through the participants' responses to the test items were analyzed using descriptive statistics and the independent samples t test.

Results: There was a significant difference in understanding metaphorical and simile expressions between children with CIs and the normal children ($p<0.05$) in favor of the normal children. The mean±SD scores for the metaphorical and simile expressions in normal children were 9.57±1.78 and 8.11±2.39 while in children with CIs, they were 5.34±2.35 and 6.17±3.24, respectively.

Conclusion: Although the cochlear implantation improves the auditory perception of deaf children, the perception of children with CIs was found to be weaker than normal children. Apparently, these children have spent several years of their lives without hearing, and this deprivation is likely to affect their understanding.

Keywords: Conceptual metaphors; perception; hearing loss; cochlear implantation

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Introduction

In traditional studies, metaphor was considered as a literary figure of speech used only in poetry. In a sense, metaphor was found when a term implied something else. Traditional studies have suggested that by removing one of the elements in simile, it turns into a metaphor. These studies define simile a simple form of metaphor [1]. Cognitive approach, however, treats metaphor

mainly as a conceptual mechanism [2]. Lakoff and Johnson introduced a new approach in contrast to traditional studies on metaphor. The authors believed that metaphor was not merely a figure of speech represented in words, but a cognitive and mental phenomenon, and what appears in the language is only a manifestation of this mental phenomenon [3]. According to conceptual metaphor, a concept is understood based on another concept [4]. In the sense that more abstract concepts are understood in terms of more concrete concepts [5,6]. For example, in the sentence "Beth is a peach," the sweetening property is selected for mapping, and other attributes are excluded, and this feature is applied to the domain of humanity [7]. Simile constitutes more or less the same conceptual mechanism.

Hearing loss affects verbal or non-verbal comprehension or expression, which may affect the receptive language (difficulty in understanding others) or expressive language (problem with the transfer of ideas and thoughts) [8]. One of the most important issues with hearing impaired children is the ways in which they understand metaphorical expressions and terms. When a child suffers from hearing impairment at the age of one to five, his linguistic evolution is delayed [9].

One way to overcome deep and severe neuropsychological injury is cochlear implantation. The cochlear implant (CI) is an electrical device placed in the inner ear through surgery and provides a feeling of hearing in severe sensory and nervous hearing impaired patients [10,11]. In fact, CIs convert the mechanical energy of the sound into an electrical stimulus to directly stimulate the remaining auditory nerves [12]. Based on the evidence, if the cochlear implantation is done earlier in life, the linguistic and communication abilities of the affected individual will be closer to people with normal hearing and such a person will have more success in education [13]. In fact, following the implementation, the person is expected to develop language skills such as general information, counting, vocabulary, and understanding of progress [14]. The results of research on normal and hearing-impaired children by Nicastri et al. [15] showed that children with CIs have more difficulty in understanding metaphors compared to their normal peers. It was also stated that the implanting age had an effect on the child's understanding, so that hearing-impaired children who had cochlear implantation earlier in their lives had a better understanding of metaphors. Ambrose et al. [16] conducted a research on hearing-impaired children. The results of this study showed that such children have difficulty in acquiring words, learning polysemous, and abstract words as well as auditory, phonological, semantic, and syntactic memory. Another study by Giang and Inho [17] was conducted on 215 hearing impaired children and 557 normal hearing children to examine their perception of terms and proverbs. The results showed that hearing impaired children showed a weaker understanding of metaphors. Rittenhouse and Steams [18] conducted another research on metaphorical understanding of 10-year-old children with mild hearing-impaired problems, and found that the children had the ability to understand the metaphorical language in a regular and systematic way. Mohammadi et al. [19] conducted a research on 25 hearing-impaired students and 50 normal hearing students using randomized sampling. Their results showed that the false responses of hearing-impaired students to the test indicated their incomplete understanding of metaphorical expressions and the significant difference between the hearing and hearing-impaired students in a mixed educational setting in understanding the metaphorical expressions revealed that the educational environment cannot be effective in understanding these compounds. The study results of Mehri et al. [20] showed a significant difference in the mean scores of functional language competency between the normal hearing and hearing-impaired children, who scored significantly lower in all nine categories. Given the few studies on the comparison of linguistic perceptions of cochlear implantation and normal children, this study was conducted with the aim of comparing the linguistic perceptions among normal hearing children and those with CIs.

Methods

Study design

In this study, a descriptive and ex post facto or causal comparison method was used. The researcher did not change any variables, but merely observed and examined the existing conditions because the children with hearing disorders had already undergone cochlear implantation, their understanding of the metaphorical expressions was compared with that of the normal children.

Research population and statistical sample

The research population consisted of 35 hearing-impaired students with cochlear implantation and 35 normal peers in Isfahan. The participants' age in the two groups ranged from 8 to 12 years with an average (SD) age of 9.49 (1.40) year. The range of age for cochlear implantation in the hearing-impaired children was 2 to 5 years old. Due to the small size of the population, all members of the population were used as the research sample (35 children with CIs and 35 normal children).

As the main criterion for entering the study was having cochlear implantation, a targeted or accessible sampling method was used. Besides by using random sampling, normal students were selected who matched with the cochlear implanted children. The inclusion criteria for cochlear implantation children were having at least 2 years of cochlear implantation without any history of other physical, emotional, and behavioral disorders. In order to select the children with the desired characteristics, the researcher referred to the Extraordinary Education Directorate and provided a comprehensive list of the number of children with cochlear implanted who were studying at normal schools. The total number of the students who met the inclusion criteria was 38, out of them 3 students were excluded. In order to select a sample of normal children, a normal child was selected randomly for each child with CI. For this purpose, 35 normal students were selected randomly by using the student lists.

Data collection tool

A vocabulary comprehension test was administered as the pretest and video stories method as the main test.

To ensure that the lack of understanding of metaphors is not the result of a difficulty of the terms used in the metaphor expressions, a vocabulary comprehension pretest was designed. Then its validity and reliability were checked and confirmed. In this test, for every word used in the metaphorical expression, three images were designed, one conveying the exact meaning of the word, and two other images were irrelevant. Every word was spelled out and the child was asked to point the correct image after hearing the word. If the child responded correctly to 75% of the pretest vocabulary items, the main test was taken from him or her. Otherwise the child was excluded from the study.

In the main test, the field of emotion from the domain of conceptual metaphor was chosen, and from this domain three concepts of anger, happiness, and fear were emphasized. Then for each concept two metaphorical expressions were written. In these metaphorical expressions, new and unfamiliar metaphors that were considered suitable for Iranian children and possessed metaphorical characteristics were chosen. Finally these metaphors were expressed in the form of sentences, and rewritten in simile expressions to compare with metaphorical expressions. Afterwards for each metaphorical expression, four images were designed. A generic image depicted the metaphorical concept, the story plot, and the setting, which included three images and, in fact, test options. An image contained the correct meaning of the metaphor, another image had its literal meaning, which is, of course, a false response, and the last image represented an irrelevant meaning of the metaphor, which was one of the words of our metaphorical expression. In the scoring procedure, each correct answer received 2 points, each half-correct response was given 1 point, and finally each false answer scored 0.

To assess content validity, the test was reviewed by 10 experts and they commented on the relevance of each item, its simplicity in terms of

Table 1. Mean (standard deviation) scores for metaphorical expressions in two groups of normal children and those with cochlear implantation

	Mean (SD) score		
	Normal children	**Cochlear implants**	**p**
Anger	3.22 (0.94)	1.80 (0.91)	0.0001
Happiness	3.28 (0.85)	1.74 (0.93)	0.0001
Fear	3.05 (0.99)	1.80 (1.20)	0.0001
Total metaphorical expressions	9. 57 (1.78)	5.34 (2.35)	0.0001

wording and grammaticality, and its obviousness in terms of translation and adaptation based on a scoring scale. Then, the content validity index (CVI) was calculated which was higher than 0.75 in all terms. In addition, the internal consistency of the test was 0.78 by the Cronbach α computation method, which is an acceptable value.

Data collection procedure

After listing the students' names and obtaining the license from Isfahan Province General Education Office, Isfahan Exceptional Education Administration, and parents' consent, the examiner referred to 32 schools in 5 districts of Isfahan during a three month period in the academic year of 2016-2017 and administered the tests to the participants. The examiner, after establishing a friendly relationship with the participants, asked them to carefully look at the test images and show the best image that represented the meaning of the statement given by the examiner. The collected data were analyzed by the independent t test in SPSS 24.

Results

The results of the descriptive statistics showed that there were 14 (40%), 8 (22.8%), 7 (20%), 3 (8.6%), and 3 (8.6%) CI children in the second, third, fourth, fifth and sixth grades, respectively. In addition, the corresponding values for the normal children were 12 (34.3%), 7 (20%), 9 (25.7%), 2 (5.7%), and 5 (14.3%), respectively. The results of this study concerning the metaphorical expressions are presented in Table 1, and the results for simile expressions are presented in Table 2.

Table 1 shows the mean scores and standard deviation for metaphorical expressions in two groups of normal children and children with cochlear implantation. The results indicate that the normal children group has a higher mean score (9.57) for metaphorical expressions than the implanted group (5.34). The standard deviation of metaphorical expressions in normal children and cochlear implants was 1.78 and 2.35, respectively. There is a significant difference between children with CIs and normal children ($p<0.05$) with respect to mean scores on metaphors, including anger, happiness and fear and the total metaphor scores.

Table 2 shows the mean scores and standard deviation for the participants' perceptions of simile expressions in both groups. The results indicate that the normal children have a relatively higher mean score (8.11) compared to the children with CIs (6.17) in understanding the simile expressions. The standard deviation of simile expressions in normal children and cochlear implants was 2.39 and 3.24, respectively. There is a significant difference between two groups in terms of their perceptions of simile expressions ($p<0.05$).

Discussion

The main objective of this paper was to

Table 2. Mean (standard deviation) scores for simile expressions in two groups of normal children and those with cochlear implantation

	Mean (SD) score		
	Normal children	**Cochlear implants**	**p**
Anger	2.60 (1.11)	2.02 (1.15)	0.039
Happiness	2.82 (1.04)	2.05 (1.10)	0.004
Fear	2.68 (1.13)	2.08 (1.12)	0.029
Total simile expressions	8.11 (2.39)	6.17 (3.24)	0.006

determine and compare the understanding of metaphorical expressions between the children with CIs and the normal children. The experiment was carried upon 35 subjects of each group aged between 8 to 12 years. The quantitative findings presented in Tables 1 and 2 indicate a sharp and statistically significant differences between these two groups. This means that the CI children have a better performance in understanding the metaphorical expressions in contrast to their corresponding non-cochlear implant children. Nonetheless, the degree of metaphorical conceptualization among the group of normal children has been much greater than the group of cochlear implant children.

In other words, comparing the understanding of metaphorical expressions between normal hearing and hearing-impaired students showed a significant difference between two groups. The mean scores for understanding of the metaphorical and simile expressions by normal children were higher than those for children with cochlear implantation. Therefore, there was a significant difference between the perceptions of metaphors of anger, happiness and fear, as well as the total scores for metaphorical expressions between two groups of CI and normal children ($p<0.05$). Accordingly, two groups of cochlear implantation and normal children have a different understanding of metaphorical expressions for concepts such as anger, happiness, and fear in the favor of normal children. The results of this study were in line with the studies conducted by Giang and Inho [17], Mohammadi et al. [19] and Mehri et al. [20], but contradicted the results of the research by Rittenhouse and Steams [18]. Despite the practice of cochlear implantation in deaf children and their education in ordinary schools (in a mixed educational setting) and having more interaction with normal peers, one can expect an equally good performance on the part of children with CIs at an early age as is the case with normal children. However, as the findings of this study indicated, there was a significant difference between the normal children and those with CIs, and the cochlear implantation children had a lower understanding of simile and metaphorical expressions. Although cochlear implanted children are able to develop skills in many aspects of their lives similar to their normal peers, they lag in some aspects of language development. Because they spend several years of their lives without hearing any sound of the language, their lexical competence is not as perfect as that of the normal children. The lack of lexical development has had a profound effect on the understanding of abstract concepts by these children. Therefore, they judged the meaning of metaphorical expressions based on the literal meaning of the words, and often choose it as the correct answer, which indicates they have difficulty in understanding idiomatic and metaphorical expressions and terms.

Conclusion

The results of this study showed a difference between the performance of children with CIs and normal children in terms of understanding metaphorical expressions in the favor of normal children. Although the impaired-hearing children have had cochlear implantation, they had a lower understanding and difficulty in terms of linguistic skills. Therefore, they need further speech and language trainings. This study had a number of limitations that may endanger the generalization of the results, including the limitation in the researcher-made data collection instruments in this study. Another limitation relates to its sample which is limited to only 8 to 12 years old children of Isfahan in a specific time period.

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Conflict of interest

The authors declare that they have no conflict of interest.

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