




Comprehension problems of embodied metaphors in 5 to 7 year-old hearing impaired Persian speaking children

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Abstract

Background: In cognitive linguistics, the key factor in understanding of the abstract and metaphorical concepts is the individuals' embodied experiences sensed by their body. Therefore, a better understanding of abstract concepts requires healthy senses and feelings. Hearing impairment leads to disorders in understanding abstract concepts. The present study is aimed to investigate the differences between 5 to 7 year-old Persian-speaking hearing-impaired children and their normal counterparts in terms of understanding embodied conceptual metaphors.

Methods: The present study was conducted on twenty 5 to 7 year-old Persian-speaking children with moderate to severe hearing impairment. The study investigated the participants' understanding of abstract concepts when using embodied metaphors in four sensory-motor organs (the eyes, ears, hands and legs) through conducting a researcher-made task including both audio and audio-visual sections. The results of the hearing-impaired children were compared with the performance of 200 normal children.

Results: The findings of the present study indicated a significantly lower mean score of hearing-impaired children compared to their normal peers. The mean score of hearing-impaired participants was 9.6, while their normal counterparts scored 24.51. Moreover, it was indicated that the performance of 6 to 7 year-old hearing-impaired children was better than the 5 to 6 year-old children.

Conclusion: Despite the quick reception through hearing aids, hearing-impaired children are unable to understand abstract and metaphorical concepts although they have an acceptable language competence unless receiving a direct professional training to understand the metaphors. The hearing-impaired children tend to interpret the metaphorical concepts literally and fail to understand the abstract metaphorical concepts. The findings of the present study clearly revealed the necessity of designing a cognitive rehabilitation protocol dedicated to the abstract concepts.

Keywords: Embodied Metaphors, Conceptual Metaphors, Hearing Impaired, Abstract Concepts

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Introduction

We know our world through our experiences. The sensory-motor system is the primary cognition tool of human beings (1). In cognitive linguistics, metaphor is defined as understanding a conceptual domain through another conceptual domain (2). According to cognitive linguistics, the children's experiences through their bodies play a decisive

role in understanding the metaphorical concepts of conceptual metaphors. Our knowledge is formed based on objective concepts and these objective concepts are experienced by our bodies, i.e. they are embodied. Conceptual metaphors are meaningful when they are grounded in the mind. Minds are not studied without referring to the bod-

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↑What is "already known" in this topic:

Our conceptual structures are embodied. Up to cognitive linguistic studies, it is not merely a figure of speech or a form of literary expression but an active process in the human cognitive system.

→What this article adds:

The hearing-impaired children tend to interpret the metaphorical concepts literally and fail to understand the abstract metaphorical concepts.

ies, so our conceptual structures are embodied (3).

The cognitive linguistic studies, in the recent decades, have presented a new nature of metaphor, whereby it is not merely a figure of speech or a form of literary expression but an active process in the human cognitive system. This view was first put forward in 1980 by George Lakoff and Mark Johnson (2). They argued that the properties of concepts are essentially the results of the structures and interactions of our body and brain in individual and physical world. The embodied mind theory assumes that the same neuronal system involved in the sensory perception (or physical movement) plays a central role in conceptualization. That is, the same mechanisms responsible for the sensory perception, movement, and manipulation of objects can also be responsible for conceptualization and reasoning (4). Metaphor is not just limited to language, i.e. words, but it includes a major part of intellectual processes. Metaphors, prior to learning a language, are the bases of embodied experience and in fact, the foregrounding experiences are the sources of metaphors and interconnect the initial sensory-motor experiences and the conceptual metaphors (5). Regarding this matter, the conceptual metaphors in the present study are basically based on the sensory-motor organs (eyes, ears, hands, and legs); this is the most important difference between the present study and the other research conducted on this issue and deaf people, which will be explained in the following.

The metaphors enter our lives so naturally and spontaneously that we are likely to ignore them. Similar to many other bio-psychological and communicative phenomena and processes, metaphors may appear as simple concepts with no need for definition and explanation (6). Vosniadou (1987) stated that the metaphorical development in children is continuous and it cannot be regarded a sudden process. She believed that since the metaphorical language calls for knowledge transfer from one domain to another, the enrichment of conceptual knowledge is a prerequisite in development of metaphorical language in children (7).

Regarding the defects in their sensory-hearing inputs, hearing-impaired individuals may suffer from numerous problems in understanding the conceptual metaphorical structures. Studies have indicated that severe hearing impairment disrupts almost all aspects of healthy psychosocial development (8). Bust (1953) stated that hearing-impaired individuals are completely objective thinkers who deal with numerous problems in visual learning. Conley (1976), also reported that hearing-impaired children exhibit a significantly poorer performance in understanding English idioms and expressions when compared with their normal-hearing peers (9).

Regarding their inability to understand the metaphorical expressions, hearing-impaired individuals may fail in proper understanding of texts and even everyday conversations. For example, if they read a sentence like (They suffered a great loss in war) in a book, they will attempt to look for something that was "lost" or "suffered" in the war, regarding their objective understanding. Such errors may be problematic in their communications with others. These individuals often deal with numerous misunderstandings in their communications or even they may fail in

continuing the conversation topic. As the hearing-impaired individuals may fail to learn metaphorical expressions, they may face numerous problems in their everyday communications which highlight the necessity of a proper rehabilitation program.

Gigan and Inho (2015) conducted a study on hearing impaired children in grade 1-5 of primary school. They reported that the hearing-impaired children's understanding of the symbolic language was much lower than their normal-hearing peers. Furthermore, the hearing-impaired children's understanding of the symbolic language was even less than the younger healthy peers. Moreover, the results showed that the understanding of the symbolic language is a developmental process in hearing-impaired children. Gigan and Inho also asserted that the development of symbolic language is similar in both hearing-impaired and the developing children; but the former develop at a slower pace (10). Rittenhouse and Kenyon (1991) investigated the acquisition of linguistic metaphors in 6 to 19 year-old hearing-impaired children; where a positive significant relationship was observed between the age and the acquisition of metaphors. In addition, they indicated that metaphor acquisition has nothing to do with the children's hearing deficit and communicative method (11).

Mohammadi, et al. (2009) investigated the understanding of metaphorical expressions in developing hearing children and hearing-impaired Persian-speaking children. Their findings indicated that hearing-impaired students made no progress in understanding of the metaphorical expressions during the first three educational grades; as their wrong answers were indicative of their literal understanding of the metaphors (9).

The main purpose of the present study is to compare the 5 to 7 year-old hearing-impaired and developing Persian-speaking children in terms of their understanding of the embodied conceptual metaphors. Literature review showed no studies on the embodied conceptual metaphors in 5-7 year-old hearing-impaired children in Persian; therefore, specifying differences in perception of abstract concepts in hearing-impaired children compared to natural children can provide frameworks for designing rehabilitative programs in future studies.

We hypothesize that 5 to 7 year-old hearing-impaired children perform poorer in understanding the embodied conceptual metaphors when compared with their developing peers. Our second hypothesis is that as metaphor is a growth process, therefore 6 to 7 year-old hearing-impaired children's understanding of the embodied conceptual metaphors is better than that of the 5 to 6 year-old children. We also hypothesize that because of hearing restriction the hearing-impaired children would perform better in the audio-visual task compared to the audio task.

Methods

Participants

The present study was conducted on 20 5 to 7 year-old Persian-speaking children with moderate to severe hearing impairment and with mean age of 6 years and 2 months and standard deviation of 5. The hearing-impaired chil-

dren were compared with 200 5 to 7 year-old developing children. Because of the difference in Binaural Hearing with hearing aids and monaural hearing with Cochlear implant, those who underwent cochlear implantation were excluded from the study. The hearing-impaired children's language level was required not to be lower than that of a four-year-old child. Children who had completed their clinical speech therapy course were selected as participants. Moreover, according to their speech-language pathologists, these children had been discharged when achieved a desirable level of language skills. All hearing impaired people in this study were evaluated by the Nilipour's (2017) Language Assessment Test and those with a language level of over 4 years were selected.

The hearing-impaired children of the present study had no distinguishing disorders but the hearing-impairment. Furthermore, the participants had received hearing aids before the age of two for 3 years. And at least they should have had two years of continuously attending at Speech Therapy classes. All the participants were Persian monolinguals and their parents had no hearing impairments. Parents of the hearing impaired completed and signed the letter of consent before the start of the research.

In addition, the developing children of the present study were selected randomly from schools and kindergartens in Tehran and the criteria for their entry into the study were normal development of speech, language and hearing. All participants in the study (normal-hearing and hearing-impaired) were tested for Digit Span Memory and those whose level of memory was less than 5 words (at the word level), were excluded from this study.

Materials and design

First, the embodied conceptual metaphors understanding skill was investigated in 200 5-7 year-old developing children through a researcher-made task. Then, the hearing-impaired children's understanding of embodied conceptual metaphors was tested by a researcher-made task at a speech-therapy clinic.

The task used in the present study included 39 common Persian embodied conceptual metaphors related to four sensory-motor organs (eyes, ears, hands and legs). These 39 metaphors out of 171 commonly used embodied conceptual metaphors in Persian were perceived more than other metaphors by 5-7 years old children. These 171 metaphors were extracted from various texts, including Persian Folk Culture by Najafi published in 1999, and other Persian books and daily speeches.

The task was composed of two parts: audio and audio-visual sections. In each section, the participants were asked to answer as many as 30 questions as possible. The questions used in this study were divided equally between the four sensory-motor organs discussed in this study. For examining content validity of the task, three linguists and three speech and language pathologists investigated the coordination between images and stories with metaphors. Each experiment was conducted in three experimental conditions. In the audio-visual task, the participants were first presented with a sentence containing a conceptual embodied metaphor. Then, they were provided with three

images for each sentence among the 2 remaining images (conditions 1 and 2), one was related to the literal understanding of the metaphor; while the other was completely irrelevant to the intended metaphor. The participants were asked to select the most suitable one. Only one of the images matched the sentences. If the participant selected the right picture, it indicated the abstract understanding of the conceptual metaphor. For example, the sentence was given to the child: "Arman is moving, he is barehanded" and child should choose the image that Arman would put the equipment into the car alone while child choose a one-handed one at the side of truck alone. It showed that the abstract concept of metaphor was not understood and interpreted literally.

In the second section, there were 30 questions in the audio task. In each question, a metaphor was presented in the form of a short story; afterward the participant was asked to choose between three options presented to her orally: one expressing the abstract concept of the metaphor, one offering the literal understanding of the intended metaphor, and one completely irrelevant to the intended metaphor. The participants totally responded to 40 questions provided in a questionnaire specifically designed for this purpose. Twenty questions were used as fillers and were removed from the questionnaire prior to the statistical analysis.

For example, this text was read by the examiner for the child: "Mohammad's medicines are over and he can't afford his medicines because his hand is empty. It means that, Mohammad:

- a: Has nothing in his hands
- b: He has no money
- c: He has no hand

And the child should choose the right item and repeat it. In case of request of child, the question was recited again for only one more time. For matching child's memory level at this age, all options were selected shortly and utmost in 4 words.

In both parts, for the correct answer the score was one and for the wrong answer the zero score was considered and then scores were entered and analyzed in SPSS software.

Procedure

Each participant was tested individually. The task was conducted in a quiet environment in the speech-therapy room for 35-40 minutes. In the middle of the test 5 minutes of rest were given to the child. To ensure that the child is well aware of the test process, we explained the task process for all participants initially, and also gave them an example for each section as a practice. Then the task was performed and the results were recorded in answer sheets.

The purpose of the present study and the test items were completely explained to the families of hearing-impaired children participating in the present study. Moreover, the informed consent forms were signed by the families. At the end of the test, if the parents were willing to, we explained the outcome of the test.

Results

The main indexes including minimum, maximum, mean and standard deviation were analyzed. The data distribution was not normal, so nonparametric test was used.

Mann-Whitney U test was also applied to investigate the significant differences between the groups (i.e. hearing-impaired and developing children as well as two age groups i.e. 5-6 year-old children and 6-7 year-old children).

The total scores of hearing-impaired and normal-hearing participants are listed in Table 1.

As suggested by Table 1, the mean score of hearing-impaired participants was 9.6, while their normal counterparts scored 24.51. In the other words, the hearing-impaired children managed to answer to only 9.6 questions of 40 questions.

Considering the relationship between hearing-impaired and developing participants in the entire test, the null hypothesis was that the scores of hearing-impaired individuals were equal to those of the developing individuals. Table 2 presents the Mann-Whitney U test results regarding the scores of hearing-impaired and developing participants.

Given the test's significance level (0.000) which is

smaller than 0.05, this test was not statistically significant, so the null hypothesis was rejected. This means that the hearing status can affect the test scores. As the developing participants scored higher mean scores, it can be claimed that their scores are significantly higher than the mean scores acquired by the hearing-impaired participants.

The null hypothesis was defined as "the scores of hearing-impaired participants are equal to those of the developing participants in the audio-visual task. The results obtained from Mann-Whitney U test are summarized in Table 3.

As the test's significance level (0.000) is smaller than 0.05, this test was not statistically significant; hence, the null hypothesis is rejected. This implies that the hearing status can influence the test scores. Since the developing participants score higher mean scores, it can be said that their scores are significantly higher than those acquired by the hearing-impaired participants. The mean scores of audio-visual task was 11.1 in the hearing-impaired participants.

Moreover, the null hypothesis was defined as "the audio test scores of hearing-impaired participants are equal to those of the developing participants". The results obtained from Mann-Whitney U test are listed in Table 4.

Table 1. Test scores in hearing-impaired and developing participants

Participants	The mean of total scores	SD	The mean score of 5-6 year-old group	The mean score of 6-7 year-old group
Developing	24.51	4.66	26.68	24.51
Hearing-impaired	9.6	3.13	7.87	10.75

Table 2. The relationship between the total scores of hearing-impaired participants and the developing participants

Heading	Total scores
Mann-Whitney U test statistic	4.500
Asymptotic statistic	0.000

Table 3. The mean scores of audio-visual task in hearing-impaired and developing participants

Heading	Total scores
Mann-Whitney U Test statistic	19.00
Asymptotic statistic	0.000

Table 4. The mean scores of the audio task for hearing-impaired and developing participants

Heading	Total scores
Mann-Whitney U test statistic	60.000
Asymptotic statistic	0.000

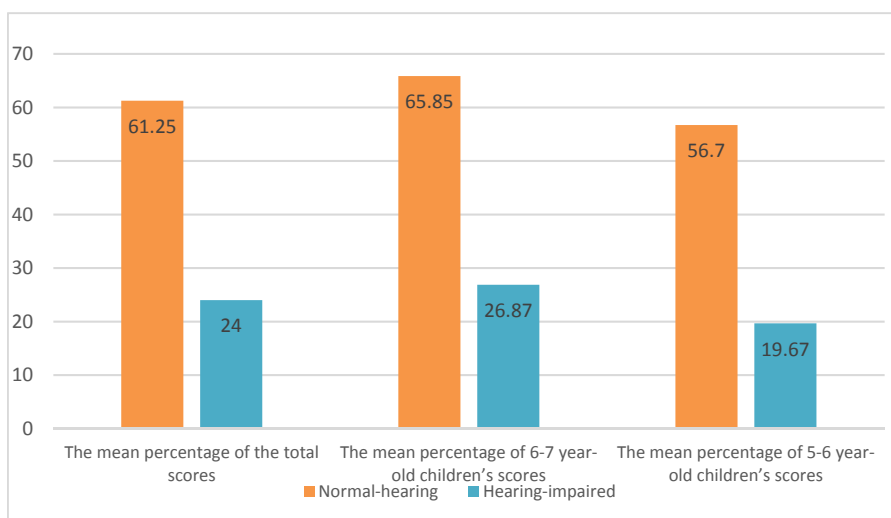


Figure 1. The mean percentage of the test scores acquired by developing and hearing-impaired participants

Table 5. Frequency of correct responses in developing and hearing-impaired groups

The organs used in metaphor	Frequency of correct response in hearing impaired group	Frequency of correct response in developing group
Eyes	19	72
Ears	34	91,75
Hands	15,5	67,75
Legs	24,5	62,7

Regarding the test's significance level (0.000) which is smaller than 0.05, this test was not statistically significant; thus, the null hypothesis is rejected. This means that the hearing status has impacts on the test scores. As the developing participants scored higher mean scores, it can be expressed that the scores of developing participants are significantly higher than those of the hearing-impaired participants. The mean score of audio test was 12.86 in the hearing-impaired participants.

The results confirm our first hypothesis, 5-7 year-old hearing-impaired children perform poorer in understanding the embodied conceptual metaphors when compared with their normal-hearing peers (Fig. 1).

As shown in Table 5, in both groups, the ear's metaphors were more understood and answered correctly than the other metaphors. In the hearing-impaired group, the second rank was related to the foot organ with a frequency of 24.5%, and in the hearing-impaired group, the second rank was related to the eye organ with a frequency of 72.

Discussion

The main aim of the present study was to compare the 5-7 year-old hearing-impaired and developing Persian-speaking children in terms of their understanding of the embodied conceptual metaphors. The results indicated that there is a significant difference in understanding abstract concepts between 5-7 year-old Persian-speaking hearing impaired children and their developing peers. There was also a developmental trend between the two groups in understanding abstract concepts when confronting conceptual metaphors. The hearing-impaired children tend to interpret metaphorical concepts literally rather than as abstract concepts. Hearing-impaired individuals are completely objective thinkers and deal with numerous problems in visual learning. Regarding their sensory-motor deprivation, the audio experiences of the hearing-impaired individuals will be more limited compared to their normal-hearing peers. As recognized in cognitive linguistics, children's experiences through their bodies are one of the decisive factors in understanding the metaphorical concepts.

According to the findings of the present study, the hearing-impaired children's mean scores regarding their understanding of embodied conceptual metaphors were significantly lower than those of the developing children. As Figure 1 shows, the hearing-impaired children managed to correctly answer to only 24% of the questions, while the developing children answered 61.25% of the questions.

The development of the symbolic language and metaphors in hearing-impaired children follows the pattern of metaphor development in normal children but slower. The results of the present study confirm this finding and as

shown in Figure 1, 6-7 year-old hearing-impaired children had better performance in metaphor comprehension task as compared to 5-6 year-old hearing-impaired children but this performance was improved at a slower rate.

The 6-7 year-old hearing-impaired children performed better than 5-6 year-old hearing-impaired children in the test indicating the improvement of the metaphors understanding in the hearing-impaired children as they get older, thus the second hypothesis confirmed as well.

As Tables 3 and 4 show, the hearing-impaired children exhibited a poorer performance (in comparison to their normal-hearing peers) in both audio and audio-visual parts of the test evaluating their understanding of embodied metaphors. Comparison of the scores acquired by the hearing-impaired children in audio and audio-visual parts of the task indicated that their mean score of the audio part (12.86) was better than their score in the audio-visual part (11.11). This difference is not, however, statistically significant; so the third hypothesis is rejected.

Based on the findings of this study, the metaphors related to ear's sensory-motor organ in both the developing and hearing-impaired groups are more widely understood than the other metaphors and due to a defect in the auditory system this case was unexpected in the hearing-impaired group. This may be because the focus of the family and therapists during the intervening years has been more on the sensory-motor component. And, that is why it has been trying to provide more experiences for children in this organ to compensate this defect. This is the researcher's analysis of this study and further research is needed to prove or disprove it.

Conclusion

According to the metaphor understanding results, the developing children showed better performance in the audio task (in comparison to the audio-visual task). This indicates that the hearing sense is one of the most important senses in understanding the abstract concepts. Hearing-impaired children have a structural deficit in this regard.

In spite of the quick reception through hearing aids, the hearing-impaired children fail to understand the abstract and metaphorical concepts despite having an acceptable language level unless they undergo a direct professional treatment for understanding the metaphors. The findings of the present study clearly reveal the necessity of designing a cognitive rehabilitation protocol dedicated to the abstract concepts.

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Conflict of Interests

The authors declare that they have no competing interests.

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مشکلات ادراکی در استعاره‌های مفهومی بدنمند در کودکان کم‌شنوای ۵ تا ۷ ساله فارسی زبان

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چکیده

مقدمه: آنچه که در زبان‌شناسی شناختی به عنوان عامل مهم در درک مفاهیم انتزاعی و استعاری شناخته می‌شود، تجربیات بدنمند هر فرد می‌باشد که توسط بدن وی تجربه می‌شوند. بر همین اساس جهت درک بهتر مفاهیم انتزاعی، برخورداری از حواس سالم بسیار اهمیت دارد. کم‌شنوایی و نقص شنوایی منجر به اختلال در درک مفاهیم انتزاعی می‌شود. هدف پژوهش حاضر بررسی تفاوت‌های درک استعاره‌های مفهومی بدنمند کودکان کم‌شنوای ۵ تا ۷ فارسی زبان با کودکان با شنوایی طبیعی، می‌باشد.

روش‌ها: پژوهش حاضر بر روی ۲۰ کودک کم‌شنوای ۵ تا ۷ ساله فارسی زبان با درجه کم‌شنوایی متوسط تا شدید انجام شد. درک استعاره‌های بدنمند در چهار اندام حسی- حرکتی چشم، گوش، دست و پا در آزمون‌شونده‌های پژوهش با یک آزمون محقق ساخته که شامل دو بخش دیداری-شنیداری و شنیداری بود مورد ارزیابی قرار گرفت. نتایج حاصل از آزمون افراد کم‌شنوا با نتایج ۲۰۰ کودک طبیعی مقایسه شد.

یافته‌ها: یافته‌های پژوهش نشان می‌دهد که میانگین نمرات کودکان کم‌شنوا در آزمون به صورت معناداری نسبت به همسالان شنوا کمتر می‌باشد. میانگین نمرات افراد با شنوایی طبیعی در آزمون ۲۴،۵۱ و در افراد کم‌شنوا ۹،۴ بود. همچنین کم‌شنوایان ۶ تا ۷ ساله به نسبت ۵ تا ۶ ساله‌ها عملکرد بهتری در آزمون داشتند.

نتیجه‌گیری: نتایج پژوهش نشان می‌دهند که کم‌شنوایان علی‌رغم دریافت زود هنگام وسیله کمک شنیداری، بدون درمان مستقیم و تخصصی در درک استعاره‌ها، علی‌رغم برخورداری از سطح زبانی نسبتاً قابل قبول، قادر به درک مفاهیم انتزاعی و استعاری نیستند. کم‌شنوایان مفاهیم استعاری را به صورت تحت‌اللفظی تعبیر می‌نمایند و در درک مفاهیم استعاری به شکل انتزاعی دچار مشکل می‌باشند. نتایج پژوهش حاضر، لزوم طراحی یک پروتکل توانبخشی شناختی، مختص مفاهیم انتزاعی را به وضوح نشان می‌دهد. واژه‌های کلیدی: استعاره‌های بدنمند، استعاره‌های مفهومی، کم‌شنوایی، مفاهیم انتزاعی

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