

## A Study of Speech Comprehension Disability Due to Hearing Impairment in Early Language Development

ZARA ZULFIQAR<sup>1</sup>

Department of Applied Linguistics  
Kinnaird College for Women  
Lahore, Pakistan

### Abstract

*Oral communication demands that the information needs to be properly received and comprehended. The speech comprehension process includes the diagnosis of individual sounds or words, compilation of words into meaningful units. This means that it requires the undivided attention and speed of information processing of central auditory pathways and the brain. If this signal of individual sounds is disturbed due to a hearing impairment or because of distractions due to noise or environment, then most of the people face problems while communication. This research explores relationship between hearing and speech impairment. Language is the most important communication tool for human beings. It has various functions to strengthen and maintain social existence. Without language, our lives would be meaningless. Brain is responsible for language production. There is a very significant relation between hearing and speech production. The present research analyzes the influence of hearing on speech comprehension. The current research aims to observe the effects of hearing impairment on a child's social behavior and interaction. It further quasi qualitatively investigates the effect on a child's learning and academic progress with the help of triangulation method. It has been carried out by incorporating the case study method. Data collection tools like observation and shortactivities*

---

<sup>1</sup> Zara Zulfiqar has recently graduated in Applied Linguistics from Kinnaird College Lahore. Her research interests are in the field of psycholinguistics and sociolinguistics. In psycholinguistics, her focus is on child's language acquisition at an early age. She aspires to be a speech pathologist.

*such as Dichotic listening test and Noise test with the child were conducted to collect data. This is followed by the analysis of data. The findings of the research suggests that hearing impairment has a negative impact on a child's social behavior as it inculcates and fosters feelings of isolation, anxiety and embarrassment in a child's personality. In the end some recommendations are also given to improve the situation of children with hearing impairment.*

**Keywords:** Dichotic listening test, quasi qualitatively, Oral communication, Early Language Development, Hearing Impairment

## 1. INTRODUCTION

It is said that the things that can be accessed easily are often taken for granted. Same is the case with humans who have taken the ability to produce speech for granted. But the sound production is not an easy job. It is a very long and complicated process which includes the sounds to be translated by the brain first and then later the brain commands the other parts for the production of the utterance. There are certain factors which can disturb the process of articulation. If a patient is suffering from any such disorder, the process of articulation is highly affected. Hence, from this fact it can be concluded that for the speech production, the parts of brain must work in coordination with each other. This balance in coordination can be altered by the slightest disturbance in the hearing. (Dronkers 2004)

Oral communication demands that the information should be properly received and comprehended. The speech comprehension process includes the diagnosis of individual sounds or words, compilation of words into meaningful units. This means that it requires the undivided attention and speed of information processing of central auditory pathways and the brain. If the signal of individual sounds is disturbed due to a hearing impairment or because of distractions due to noise or environment, then most of the people face problems while communication. This research explores relationship between hearing and speech impairment. The significance of brain and ear is undeniable. The language of a child only flourishes when his brain is able to properly comprehend the sounds and make connections between information. This process demands that the

sounds reach the brain with clarity and without any interference or overlapping of frequencies. For this matter, the ears must function properly and be able to hear clearly.

According to Noam Chomsky (Chomsky 1967), humans have an innate ability to acquire language. There is an innate apparatus that helps them to acquire, known as language acquisition device or LAD. The LAD is a black box in the human mind that facilitates the learning of a language. This is why humans are said to be biologically inclined to the acquisition of a language. According to psychologists, language is said to be a behavior and learning a behavior is done through the extrinsic stimulus. This view is also presented by Pinker. (Pinker 2005)

The current research aims to observe the effects of hearing impairment on a child's social behavior and interaction. It further quasi qualitatively investigates the effect on a child's learning and academic progress with the help of triangulation method. The child with a deficiency must be made to identify the sounds and for that purpose visuals are encouraged as this helps the child for the development of facial expression and lip reading. For this purpose, parents should make sure that there is an abundance of paralingual contacts.

## **2.1 RATIONALE:**

Hearing loss can be developed at any stage of life. But if the child suffers from hearing impairment during the process of early language development, its effect can be worse. Hence, the present research aims at identifying the problems faced by the children with hearing impairment.

## **2.2 RESEARCH OBJECTIVES**

The research draws the following objectives:

- To identify the effects of hearing impairment on patient.
- To investigate the relationship between hearing and speech comprehension.
- To explore whether Hearing influences language production.

## **2.3 RESEARCH QUESTIONS**

- What is the relationship between hearing and speech comprehension?

- How does hearing impairment influence language production?
- To what degree is the life of child suffering with hearing impairment disturbed?

## **2.4 PROBLEM STATEMENT**

Delayed language production could occur due to the right ear damage as the frequencies of the sounds can be overlapped and thus it will consequently cause an effect on speech and comprehension ability of the child.

## **3. LITERATURE REVIEW**

### **3.1 Anatomy of Brain**

There are two hemispheres of the human brain which are the left and right hemispheres. A term logical brain is assigned to the left hemisphere whereas the term creative mind is assigned to the right hemisphere. The reason is that the left hemisphere of the brain produces and analyzes the language process whereas the right hemisphere contributes to the process of imagining. Furthermore, the right side of the body is controlled by the left hemisphere and the left side of the body is controlled by the right hemisphere. The researches done on the parts of brain that produce speech and language goes back to the 19<sup>th</sup> century. It had been noted by the physicians that the patients who had brain injury showed two types of traits. The damage done to the left hemisphere resulted in the loss of the ability to produce and comprehend speech and language, while in the patients with injury in the right hemisphere of the brain no such results were seen. A few recent studies have shown very interesting results. It shows that in 97% of the people around the globe, language producing area is the left hemisphere. But in the left-handed people there is a variation. The language in this type of people is represented in the right hemisphere. It can be seen as many as 19% of the total population of the world. Furthermore, 68% of the people have the ability to produce the language in the both the hemispheres i.e. left and right. (Mandal 2012)

### **3.2 Determination of language areas**

The world is advancing at a rapid pace. Hence, a successful progress can be seen in understanding the human body. One of the complex

organs of a body to understand is brain. Hence to analyze the centers of the brain that deal with the production of speech a method called the cortical stimulation mapping is used. This technique is used while performing the surgery of brain on patients with epilepsy or removing the tumor. In this case, an electrical impulse given to the cortex present in the left hemisphere of the brain does not allow the patient to say the name of the things that are shown to them. Furthermore, the patients are also unable to produce sentences that are coherent grammatically. Hence, when the surgeons identify such an area they secure because damage to this area may lead to speech loss which can be permanent or temporary. (Mandal 2012)

### **3.3 Speech and language brain regions**

Cerebrum that is the outer portion of the brain is covered with a thin layer of brain called cerebral cortex. It is known as the gray matter as the nerves here lack insulation. It is covered by meninges. The cerebral cortex has many parts. These parts include the visual and auditory cortex. In the first part, visual information is processed and in the latter part is responsible for the processing of the auditory information. The cerebral cortex of the brain is the highly developed area of the brain. This is the area of the brain that is involved in the most intricate process of developing, processing and comprehending language. Any damage to this area of the brain creates has grave results. Furthermore, two major areas for language production were identified by the neurologists. One is Wernicke's area and it was discovered by a German neurologist Carl Wernicke, and was also named after him. This are of the brain is responsible for speech and also language in both written and spoken forms. Wernicke discovered how this area is responsible for producing words and syllables. In the frontal lobe of the cerebral cortex, there is an area which is responsible for the actual speech production. This area was discovered by Paul Broca and was also named after them. Broca discovered that patients with an injury to this area of the brain show the inability to produce speech. (Kennison 2013)

### **3.4 The hearing system**

The ear is divided into two main parts, the external ear and the internal part. The external part consists of inner, outer and middle ear. The pinna and the ear canal i.e. the constituents of outer ear,

receives the sound signal and then they transport them to the middle ear. Here, the signal is transferred to the cochlea in the inner ear. There are two types of hair present along with the membrane. The inner hair cells transfer the information to the central auditory system whereas the outer hair cells recognize the sounds, amplifies them so that they are properly heard by the ear. Both the types of hair are important for the smooth and proper functioning of the ear. The position of this hair also tells about the frequency of the signal. In the central auditory system, the message is disintegrated into several nucleuses which contain nerve cells. These cells respond to several unique properties and will filter the information that is necessary for comprehension of speech. For example, some nuclei can focus on the perception of vowels and some for consonants. Therefore, information signal is processed in the sub-cortical areas even before reaching the cerebrum in the brain. The map of cochlea is topographical as the signals first go to the temporal lobes and the auditory cortex in the ear. Here, auditory sensation and comprehension of signal takes place. From here, the information reaches the Wernicke's area in the left hemisphere. Here, spoken language is received and comprehended. (Andrews 1997)

### **3.5 Cognitive functions in speech comprehension**

The process of speech not only indicates about the stimulus that is perceived but also the decoding of that specific information in the light of previous experiences. The categorization and relation between different things such as contextual, lexical, semantic and pragmatic are stored in the long-term memory of the brain. Thus, in decoding of every information, the bottom-up or top-bottom approach goes hand in hand with the stimulus received. Hence, hearing not only includes audition but also cognition. According to the theoretical models of Baddeley, in language comprehension the working memory plays an important part and it is also responsible for storing messages in the long-term memory. The major area of the working memory is characterized to control the attention and store immediate information in the short-term memory. This process demands that no hurdle comes in between. If the incoming signal is limited i.e. due to the difficulties in hearing or in situations where listening is very difficult, then the focus relies more on the cognitive activity of the brain. The brain then uses the top-down approach to understand and

link the incoming signal with the context of previous experiences. (Baddeley 1999)

Researches have indicated that the cognitive ability face a severe decline with the increase in age. The working memory also shows a decline and it is seen that it has a lot of load on it and has a high demand to work. This results in the decrease in the performance ability in the older people. (Birren 1995). It has also been shown that due to hearing impairment or in deaf people, the cognitive ability of the brain also declines. And this severely affects the phonological performance of an older person because no hearing impulse is received in them. The noise works like fuel to fire for them, making it extremely difficult for people with poorer hearing ability to listen and comprehend speech. (Birren 1995)

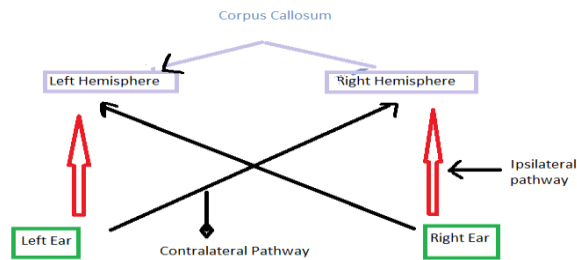
### **3.6 Hearing impairment**

There are many classifications of hearing impairments depending upon their anatomy. If the transfer of signal is disrupted in the outer or middle ear, also known as conductive hearing loss, then it results in a weakens but relatively formulated auditory signal. This problem is not severe and it can be easily treated with hearing aids. If the problem lies in the cochlea or the auditory nerve then it is known as sensor neural hearing impairment. One of the major causes of this impairment is the defect in hair cells in the cochlea. And the hair at the outer part is more likely to be damaged than the inner ones. The hearing impairment can also be caused by the aging of the auditory system. This results in the basal part of cochlea to be affected. Hence, in this kind of impairment the loss is of more severe degree. (Humes 1990)

### **3.7 Dichotic listening test**

This test is psychological test that is used to interpret the attention that a person gives to an auditory stimulus. It is studied under neuroscience and cognitive psychology. This test is especially used to understand the behavior of a person for the lateralization of the brain where sound perceived. The experiments of this test reveal that our ears respond to different sound signals differently. It is commonly accepted that the 95% population is left hemispheric language lateralized. If the input given to them is verbal then they report that the stimulus at the right ear arrives more accurately than the left ear.

This ability is known as Right Ear Advantage. There are two explanations for this theory. One is the structural theory and the other is the attentional theory. The structural theory states that since the right ear is directly connected with the left hemisphere therefore, sounds reach the brain faster through this pathway. Sounds through the left ear have to take an indirect pathway i.e. it first reaches the right hemisphere and from there it reaches the language processing left hemisphere. The direct pathway of the ear with the hemisphere is known as ipsilateral pathway whereas the contralateral pathways through which hemispheres control the sound signals and these pathways are more dominant than the ones at the same side.



*The figure shown above shows the pathways in the hearing system.*

The attention theory states that attention also plays an important role in determining the laterality of the language processing hemispheres in the brain. (Kimura 1967)

### 3.8 Auditory Processing Disorder (APD)

The disorder that effect the way a brain processes auditory signals is called Auditory Processing Disorder (APD). The patients have usually normal functioning ears. However, these people are unable to comprehend information just like other people do. They are unable to recognize sounds. Children suffering with APD are supposed to hear the sounds normally. They are reported to hear sounds signals normally in a very peaceful environment. The issue is that they are unable to understand the differences between sounds in words, although the words are also loud and clear.

There have been complains registered by listeners who have faced difficulties in the speech comprehension due to the noise. These difficulties are a result of hearing loss. There is persistence in such



reports. However, there are only isolated attempts to measure the magnitude of this difficulty in communication systematically. (Niemeyer 1965)

The literature about people with difficulties in understanding speech in the presence of noise is very complicated. The reason for such a complicated literature is that the individuals with hearing impairment have shown outstanding results in recognizing speech in a quiet environment. Moreover, there is no method by which we can measure speech recognition in case of noise.

The literature collected from reports by Plomp and his fellows and by other researchers has suggested that the individuals with normal hearing and the individuals with hearing impairment perform differently in a noisy environment. It is suggested that the listeners with hearing impairment face a great deal of difficulties while recognizing speech in noise. (Plomp 1979)

Plomp and Duquesnoy in 1982 developed a quantitative model. This model suggested that there are two factors that influence speech due to hearing loss. One is the factor of attenuation and the other is the factor of distortion. The attenuation factor results in the reduction of the levels of signals that are speech and noise and the distortion factor result in reducing the functional ratio of signal to noise. The results of their evaluation state that speech recognition in quiet, there is a contribution of both factors whereas during noise the distortion factors affect speech comprehension immensely. (R. a. Plomp 1982)

It has been shown that the children tend to be more affected by the unnecessary auditory situations as compared to adults. These are the results of the psychoacoustic studies. These studies were mostly conducted in research laboratory settings. The focus of this study was to identify syllables through the noise effects. Generally, it was seen that in conditions where signal was provided in a peaceful environment without the distortion of sound, the results of the children and adults are more likely to be same. However, if there is any sort of disturbance due to noise, the results are adverse in children. (Cooper Jr 1971)

### **3.9 Cognitive Development:**

The process of the development of cognition is similar in normal children as well as the children with hearing impairment, considering

that the inborn ability to communicate is looked upon. In case of problems that can be inherited such as deafness, the parents feeling must be addressed first. The parents should be realized of the fact that instead of being sad on not having a normal child with hearing, they should accept their as he is. The bond between the parents also needs to be very strong especially with the mother because in the early days the child spends most of the time with his mother and it is basically the time when his language starts formulating and there is a development in child in terms of social and cognitive ability (Preisler 2002)

According to Noam Chomsky (1965), humans have an innate ability to acquire language. There is an innate apparatus that helps them to acquire, known as language acquisition device or LAD. The LAD is a black box in the human mind that facilitates the learning of a language. This is why humans are said to be biologically inclined to the acquisition of a language. According to psychology, language is said to be a behavior and learning a behavior is done through the extrinsic stimulus. This view is also presented by Pinker (1997). The child with a deficiency must be made to identify the sounds and for that purpose visuals are encouraged as this helps the child for the development of facial expression and lip reading. For this purpose, parents should make sure that there is an abundance of paralingual contacts.

In the present world, however, the development of the language is combined by two different views. Therefore, though people believe that children have an inborn ability to acquire a language but at the same time the external stimuli and their own personal experiences play a vital role in learning a language. Thus, the theories given by Vygotsky and Piaget (1993, 2003) that are social-interactive in nature states that the social interactions that a child encounters determine the development of a child's verbal language development. (Piaget 1976)

Not only the communication or the language learning skills but also the psychomotor development is affected by the hearing impairments. The central nervous system and the motor skills are also affected. Moreover, the time-spacing structuring and psychoaffective balance is affected by the hearing impairments. Everything including certain immature functions and the disabilities can be cured if a person is hearing properly. By improving the hearing

recovery in patients suffering with autism and deafness who feel that they can be challenged by the human voice, can be recovered. The influence of the family on the child is very necessary. (Gayda 2004)

The initial cognitive development of a child starts from basic skills such as his knowledge about the cause and effect of any situation to the most complex situations and solving problems and remembering previous instances. Such skills are only developed if a child is allowed to do activities that are appropriate for his age. Furthermore, these skills and abilities of a child lead to his cognitive development.

Hearing loss is a very big trauma in a child's life. It has a very negative impact on a child's ability to acquire language because of its limitations of the external auditory environment. But these effects can also be varied depending upon how early and how effectively the case of hearing impairment is managed. It has been discovered lately that the development of a brain in a child's early life can be affected if the auditory cortex is not properly stimulated. (Kuhl 1996)

Hearing is also characterized with the visual aids. At early stages, child tends to look for every sound that he hears. If this integration between the audiovisuals is disturbed then it also leads to the lack of input provided to the brain. This is the process of speech perception which contributes to the audiovisual activities. The child not only engages in the hearing but also tries to find the visual cues about what he is hearing. (Kuhl 1996)

## **4. RESEARCH METHODOLOGY**

### **4.1 Nature of the Research**

The method of research included analysis and observation of the subject under study to gain better understanding of the research problem. Previous researches and books were studied to gain a deeper insight and understanding of the topic. Nonnumeric data collected through observation of the subject is used to form result. For this research, the patient and her mother and an elder sister was consulted.

### **4.2 Research Population**

A case study observation of a 9-year-old child named "Amna" was used to analyze the effects of hearing impairment on a child's speech

and learning. The child studies in 4<sup>th</sup> grade and has a hearing impairment. It was told that she was 4, when a television of some 10kg weight fell on her. Due to this incident, the child's right ear got damaged but nobody paid attention and the problem got severe. A few months ago, due to excessive reporting from her school and observing her behavior, she was taken to the hospital where after performing series of tests, it was revealed that the child has a damaged right ear.

#### **4.3 Research Tools**

The research has been carried out using case study method. Data collection tools like observation of the subject and a short interview of the child have been used to collect data. This was followed by the analysis of data. Two tests were also performed on the child. These tests include Dichotic Listening test and Noise activity.

### **5. DISCUSSION**

Sound waves are collected and channeled to the eardrum through external auditory canal and pinna, which are the most important parts of the inner ear. The eardrum starts to vibrate and then waves are produced in a small snail shaped organ, cochlea. Here, the waves are separated on the basis of frequencies. This step is very crucial because it helps the ear to differentiate. It helps people hear different things at the same time. Cochlea has a number of hair cells. Each hair cell carries different frequency. They convert the vibrations in the form of electric signals and then these signals are carried to the brain stem, where final processing occurs.

The language is processed in the brain in the two very important areas present in the left hemisphere. These areas are considered very crucial for language processing and because of them language is said to be localized and lateralized meaning these areas are present in left hemisphere only. These areas are Broca's area and Wernicke's area. The Broca's area is responsible for speech production whereas the Wernicke's area is responsible for the comprehension of the speech. The electric signal from the cochlea of the ear reaches the Wernicke's area through the nerves, and here the speech is comprehended. Therefore, there is a very deep relation between hearing and speech comprehension. Even a slight error in this process will lead to the malfunctioning of language production. Just as in the

case of the patient. Since the patient had a damaged ear, therefore, she was unable to comprehend speech properly, although her brain was working properly. The signals that reach the brain through the ears are usually overlapped and misheard. This leads to the inability to comprehend speech and the child is reported to utter nonsensical words and rely mostly on the paralinguistic features of the language. Hence, hearing not only includes audition but also cognition.

According to the theoretical models of Baddeley, in language comprehension the working memory plays an important part and it is also responsible for storing messages in the long-term memory. (Baddeley 1999) The major area of the working memory is characterized to control the attention and store immediate information in the short-term memory. This process demands that no hurdle comes in between. If the incoming signal is limited i.e. due to the difficulties in hearing or in situations where listening is very difficult, then the focus relies more on the cognitive activity of the brain. Here, the brain uses top-down approach. Top-down approach adopted by brain means that the brain uses the information that is already present and stored in it. This previous data is very crucial while understanding the upcoming information. If the incoming auditory signals are disturbed due to impairment or a disorder then the child tries to link the information stored in the brain with the paralinguistic factors. The brain uses the top-down approach to understand and link the incoming signal with the context of previous experiences but this practice can be difficult at some times and may also prove to be exhausting in the case of child.

Hearing has a great influence on human speech comprehension. It is known, that the right hemisphere of the body controls the lefts side of the body and the left hemisphere controls the right side of the body. Since the Wernicke's and Broca's area are located in the left hemisphere of the brain, therefore, the sounds heard from the right ear reach the brain quickly as compared to the sounds heard from the left ear. The reason is that when a sound is heard from the left ear, it first goes to the right hemisphere and then to the left hemisphere where the language processing units are located. This takes a considerable long- time due to the indirect pathway. Through observations, it was seen that the patient's right ear was damaged. Due to years of ignorance of this impairment, the problem got severe. This resulted in the partial loss of hearing in the

right ear. If some sounds were heard the frequencies were usually overlapped. Now the patient is mostly relying on the sounds that are heard from the left ear and due to the considerable long time, the speech comprehension and production was delayed.

Two different activities were performed on the patient and the results were collected. One of the activities was Dichotic Listening Test, while the other activity was Noise Activity.

According to Kimura, dichotic listening is defined as listening to two different auditory signals which are presented to both ears at the same time. The two theories that arise from this test are structural and attention theory. The attention theory states that attention also plays an important role in determining the laterality of the language processing hemispheres in the brain. The structural theory states that since the right ear is directly connected with the left hemisphere therefore, sounds reach the brain faster through this pathway. (Kimura 1967)

Therefore, Dichotic test was performed first on the patient. Through dichotic listening test, 'right ear advantage' was observed. This means that a person with completely fine right ear will be able to comprehend and produce speech effectively as compared to the one with impaired right ear. The reason is that the cochlea in human ear has numerous hair cells which differentiate the sounds on the basis of their frequencies. The cochlea in the right ear differentiates the sounds and sends the linguistic sounds to the brain whereas the left ear sends the nonlinguistic sounds to the brain.

The subject is given two different earphones with different sounds played simultaneously. The patient was then asked to tell what sound she heard first. This test shows the selectiveness and the attention that a patient is giving to a sound. The general results of this test suggest that the attended message is usually heard from the right ear and it is stored in short term memory. The patient can recall those speech sounds easily. The sounds heard from the left ear are usually nonlinguistic sounds. The patient told about the sounds heard from the left ear but after taking a lot of time because attention is basically given to sounds heard from right ear. It was concluded that due to the damaged right ear, the sounds can't travel to the brain effectively, therefore, resulting in inability to comprehend speech. The results of this test prove Kimura's theories, attention theory and structural theory, arose from this test to be correct.

The ability to comprehend words in the presence of noise is known as auditory processing. It has been shown that the children tend to be more affected by the unnecessary auditory situations as compared to adults. These are the results of the psychoacoustic studies. These studies were mostly conducted in research laboratory settings. The focus of this study was to identify syllables through the noise effects. Generally, it was seen that in conditions where signal was provided in a peaceful environment without the distortion of sound, the results of the children and adults are more likely to be same. However, if there is any sort of disturbance due to noise, the results are adverse in children.

Even with people with proper functioning ears can face difficulties in normal hearing. When it is combined with the hearing impairment, it creates a lot of problems to comprehend the sounds. Even the people with normal hearing can take a lot of time to select, segregate, comprehend and store information in extreme noise conditions. For the people with hearing impairment, noise proves to be a nightmare. In adverse conditions, cognitive ability faces a lot of challenges. These challenges include switching attention and controlling the interfering sounds to get the exact speech signal and then to match it with the data already present in the brain.

Noise activity was done with the patient. She was taken to a crowded bazaar. The noise from the chattering of the people and the horns of the cars made it almost impossible to listen properly. The patient was tested along with another child of the same age and same class, with proper functioning ears. Both of them were asked a question two or three times as it were difficult to understand the question for the first time. The questions were asked based on the books that both these children have been reading recently. The questions were as follow:

- Who is your favorite character from the book “Charlie and the chocolate factory”?
- Will you read another book of the same author?
- What did you learn from this book?

The questions asked from them were limited because of the time taken by them.

The other child took some time and then finally answered the question correctly whereas the patient couldn't comprehend the question properly and needed an assistance to properly understand

the question. This test proved that even a normal person is at risk while listening to something in a very crowded area. And for people with hearing impairment, it becomes nearly impossible to comprehend and produce speech.

At the early age, a child is subjected to a variety of environments. Through interactions with people from different backgrounds, a child's language flourishes. He starts understanding the contextual demand of a language. The formal and informal usage of language is also learnt by him. But a child with hearing disability is unable to understand the contextual demand. His language is severely affected. He is shown to utter nonsense language without any knowledge of formal and informal settings. The complex sentences are often clearly misunderstood by them. Hence, at this age when a child's language should be developed at a faster rate, the child due to hearing disability face serious setback.

This also incorporates the role of the parents. The parents should be realized of the fact that instead of being sad on not having a normal child with hearing, they should accept their child as he is. The bond between the parents also needs to be very strong especially with the mother because the child spends most of the time with his mother and it is basically the time when his language starts formulating and there is a development in child in terms of social and cognitive ability. The child with a deficiency must be made to identify the sounds and for that purpose visuals are encouraged as this helps the child for the development of facial expression and lip reading. For this purpose, parents should make sure that there is an abundance of paralingual contacts.

One of the key elements of human functioning is the ability to communicate with others properly. In this process, people communicate with others through the exchange of information, signals and behavior. Moreover, in the present world, the development of the language is combined by two different views. Therefore, though people believe that children have an inborn ability to acquire a language but at the same the external stimuli and their own personal experiences play a vital role in learning a language. Thus, the theories given by Vygotsky and Piaget (1993, 2003) that are social-interactive in nature states that the social interactions that a child encounters determine the development of a child's verbal language development. (Piaget 1976) Human psychology states that a



person's thoughts and actions are influenced by interacting with other people around him. Hence, the problems that come in between communication with others due to hearing impairment have very grave results on the sense of security in everyday life, the quality of life is greatly affected and the patient suffers emotional and social stress. It leads the patient to social isolation. It is also said the withdrawal of a person from his social circle leads to a decline in the cognitive ability of that person.

Due to poor hearing and decline in the cognitive ability, the learning process of a person also slows down. Observation of the subject under study has revealed that the child is an average student who sits at the back of the class and does not like to go to school because she thinks that she can't hear properly what the teacher is saying. Speech comprehension is an important part of academic progress as verbal activities are necessary for a child's entire learning process. She is often bullied by her classmates because it difficult to understand what the other person is saying at first. The lack of social interaction has hindered the process of learning in this child.

## **6. CONCLUSION**

For a proper development of language, a person's ear and brain should work properly. The brain comprehends language well when proper sound signals are heard by the ear. This case study shows the importance of hearing in language production. Language is produced by an innate apparatus present in the brain as identified by Chomsky and now it is recognized a key to a human's social life. Language is said to be localized or lateralized because the areas in which the language is determined are only present in the left hemisphere of the brain. This case study showed how the damage to the ear resulted in the distortion of the sound signal that was to be sent to the brain. The results of the tests, dichotic listening test and noise test, performed on the child also show how the hearing impairment proved to be a nightmare for the child and how difficult was it for her to comprehend language. Without the ability to produce the language, a person's life leads towards social isolation. Moreover, the disability to produce language also leads to the cognitive decline in the child. The early stage is very crucial for a child as it is the time when the child learns about not only the language but also its social context. Due to poor

hearing and decline in the cognitive ability, the learning process of a person also slows down. Thus, the theories given by Vygotsky and Piaget, social-interactive in nature, stating that the social interactions that a child encounters determine the development of a child's verbal language development have seen to be proven in this case study. Therefore, the children with hearing impairment should be properly taken care of. They should not feel that they are different from other children. Here, the role of the parents is also very important. It is very obvious at a very early age the parents spend a lot of time with the child, hence it is their responsibility to do activities that will help the child in the development of her language.

### **RECOMMENDATIONS:**

Following recommendations should be kept in mind while dealing or interacting with a child with a hearing impairment.

- The patient with hearing impairment should be dealt with person.
- Parents should make sure to use hearing aids when necessary.
- One should avoid talking very fast and using complex sentences with the person.
- One shouldn't talk to the person while he is at a distance. He should come face to face with the person and then talk.
- Try talking in a peaceful environment without outside noise.

## Bibliography

1. Andrews, Timothy J., Scott D. Halpern, and Dale Purves. "Correlated size variations in human visual cortex, lateral geniculate nucleus, and optic tract." *Journal of Neuroscience* 17, no. 8, 1997: 2859-2868.
2. Baddeley, Alan D., and Robert H. Logie. ""Working memory: The multiple-component model."." n.d.: 1999.
3. Baddeley, Alan D., and Robert H. Logie. ""Working memory: The multiple-component model."." 1999.
4. Birren, James E., and Laurel M. Fisher. "Aging and speed of behavior: Possible consequences for psychological functioning." *Annual review of psychology* 46, no. 1, 1995: 329-353.
5. Chomsky, Noam. "Recent contributions to the theory of innate ideas." In *A Portrait of Twenty-five Years*. Springer, Dordrecht, 1967: 31-40.
6. Cooper Jr, J. C., and Betty P. Cutts. "Speech discrimination in noise." *Journal of Speech and Hearing Research* 14, no. 2, 1971: 332-337.
7. Dronkers, Nina, and Jennifer Ogar. " "Brain areas involved in speech production."." 2004: 1461-1462.
8. Gayda, M., and D. Saleh. "Peripheral, central and psychic deafness: diagnosis difficulties in case of autism child." *Revue de laryngologie-otologie-rhinologie* 125, no. 5, 2004: 277-280.
9. Humes, Larry E., and Lisa Roberts. "Speech-recognition difficulties of the hearing-impaired elderly: The contributions of audibility." *Journal of Speech, Language, and Hearing Research* 33, no. 4, 1990: 726-735.
10. Kennison, Shelia M. *Introduction to language development*. Sage Publications, 2013.
11. Kimura, Doreen. "Functional asymmetry of the brain in dichotic listening." *Cortex* 3, no. 2 , 1967: 163-178.
12. Kuhl, Patricia K., and Andrew N. Meltzoff. "Infant vocalizations in response to speech: Vocal imitation and developmental change." *The journal of the Acoustical Society of America* 100, no. 4 , 1996: 2425-2438.
13. Mandal, Pravat K., Rashima Mahajan, and Ivo D. Dinov. "Structural brain atlases: design, rationale, and applications in normal and pathological cohorts." *Journal of Alzheimer's Disease* 31, 2012: S169-S188.
14. Niemeyer, W. "Speech audiometry with phonetically balanced sentences." *International Audiology* 4, no. 2, 1965: 97-101.
15. Nina F Dronkers, David P Wilkins, and Branda B Redfern. "Lesion analysis of the brain areas involved in language comprehension." *Cognition* 92.1-2, 2004: 145-177.
16. Piaget, Jean. ""Piaget's theory.In Piaget and his school". Springer, Berlin, Heidelberg., 1976: 11-23.
17. Pinker, Steven. "So how does the mind work?" *Mind & Language* 20, no. 1, 2005: 1-24.
18. Plomp, R., and A. J. Duquesnoy. "A model for the speech-reception threshold in noise without and with a hearing aid." *Scandinavian Audiology. Supplementum* 15 , 1982: 95-111.
19. Plomp, Reinier, and A. M. Mimpen. "Speech-reception threshold for sentences as a function of age and noise level." *The Journal of the Acoustical Society of America* 66, no. 5, 1979: 1333-1342.
20. Preisler, Gunilla, A-L. Tvingstedt, and Margareta Ahlström. "A psychosocial follow-up study of deaf preschool children using cochlear implants." *Child: Care, Health and Development* 28, no. 5, 2002: 403-418.