Course: Audiology & Audiometry (683)
Semester: Spring, 2022

ASSIGNMENT No. 1

Q.1 a) Which profession should look together with the professionals of the field of audiology for aural rehabilitation of HIC?

An audiologist is a person who, by virtue of academic degree, clinical training, and license to practice and/or professional credential, is uniquely qualified to provide a comprehensive array of professional services related to the prevention of hearing loss and the audiologic identification, assessment, diagnosis, and treatment of persons with impairment of auditory and vestibular function, and to the prevention of impairments associated with them. Audiologists serve in a number of roles including clinician, therapist, teacher, consultant, researcher and administrator. The supervising audiologist maintains legal and ethical responsibility for all assigned audiology activities provided by audiology assistants and audiology students.

The central focus of the profession of audiology is concerned with all auditory impairments and their relationship to disorders of communication. Audiologists identify, assess, diagnose, and treat individuals with impairment of either peripheral or central auditory and/or vestibular function, and strive to prevent such impairments.

Audiologists provide clinical and academic training to students in audiology. Audiologists teach physicians, medical students, residents, and fellows about the auditory and vestibular system. Specifically, they provide instruction about identification, assessment, diagnosis, prevention, and treatment of persons with hearing and/or vestibular impairment. They provide information and training on all aspects of hearing and balance to other professions including psychology, counseling, rehabilitation, and education. Audiologists provide information on hearing and balance, hearing loss and disability, prevention of hearing loss, and treatment to business and industry. They develop and oversee hearing conservation programs in industry. Further, audiologists serve as expert witnesses within the boundaries of forensic audiology.

The audiologist is an independent practitioner who provides services in hospitals, clinics, schools, private practices and other settings in which audiologic services are relevant.

Scope of Practice

The scope of practice of audiologists is defined by the training and knowledge base of professionals who are licensed and/or credentialed to practice as audiologists. Areas of practice include the audiologic identification, assessment, diagnosis, and treatment of individuals with impairment of auditory and vestibular function, prevention of hearing loss, and research in normal and disordered auditory and vestibular function. The practice of audiology includes:

Identification

Audiologists develop and oversee hearing screening programs for persons of all ages to detect individuals with hearing loss. Audiologists may perform speech or language screening, or other screening measures, for the purpose of initial identification and referral of persons with other communication disorders.

Assessment and Diagnosis

Assessment of hearing includes the administration and interpretation of behavioral, physioacoustic, and electrophysiologic measures of the peripheral and central auditory systems. Assessment of the vestibular system includes administration and interpretation of behavioral and electrophysiologic tests of equilibrium. Assessment is accomplished using standardized testing procedures and appropriately calibrated instrumentation and leads to the diagnosis of hearing and/or vestibular abnormality.

Treatment

The audiologist is the professional who provides the full range of audiologic treatment services for persons with impairment of hearing and vestibular function. The audiologist is responsible for the evaluation, fitting, and verification of amplification devices, including assistive listening devices. The audiologist determines the appropriateness of amplification systems for persons with hearing impairment, evaluates benefit, and provides counseling and training regarding their use. Audiologists conduct otoscopic examinations, clean ear canals and remove cerumen, take ear canal impressions, select, fit, evaluate, and dispense hearing aids and other amplification systems. Audiologists assess and provide audiologic treatment for persons with tinnitus using techniques that include, but are not limited to, biofeedback, masking, hearing aids, education, and counseling. Audiologists also are involved in the treatment of persons with vestibular disorders. They participate as full members of balance treatment teams to recommend and carry out treatment and rehabilitation of impairments of vestibular function.

Audiologists provide audiologic treatment services for infants and children with hearing impairment and their families. These services may include clinical treatment, home intervention, family support, and case management.

The audiologist is a member of the implant team (e.g., cochlear implants, middle ear implantable hearing aids, fully implantable hearing aids, bone-anchored hearing aids, and all other amplification/signal processing devices) who determines audiologic candidacy based on hearing and communication information. The audiologist provides pre and post surgical assessment, counseling, and all aspects of audiologic treatment including auditory training, rehabilitation, implant programming, and maintenance of implant hardware and software.

The audiologist provides audiologic treatment to persons with hearing impairment and is a source of information for family members, other professionals, and the general public. Counseling regarding hearing loss, the use of amplification systems, and strategies for improving speech recognition is within the expertise of the audiologist. Additionally, the audiologist provides counseling regarding the effects of hearing loss on communication and psycho-social status in personal, social, and vocational arenas.

The audiologist administers audiologic identification, assessment, diagnosis, and treatment programs to children of all ages with hearing impairment from birth and preschool through school age. The audiologist is an integral part of the team within the school system that manages students with hearing impairments and students with central auditory processing disorders. The audiologist participates in the development of Individual Family Service Plans (IFSPs) and Individualized Educational Programs (IEPs), serves as a consultant in matters pertaining to classroom acoustics, assistive listening systems, hearing aids, communication, and psycho-social effects of hearing loss, and maintains both classroom assistive systems as well as students' personal hearing aids. The audiologist administers hearing screening programs in schools, and trains and supervises non audiologists performing hearing screening in the educational setting.

Hearing Conservation

The audiologist designs, implements, and coordinates industrial and community hearing conservation programs. This includes identification and amelioration of noise-hazardous conditions, identification of hearing loss, recommendation and counseling on use of hearing protection, employee education, and the training and supervision of non audiologists performing hearing screening in the industrial setting.

Intraoperative Neurophysiologic Monitoring

Audiologists administer and interpret electrophysiologic measurements of neural function including, but not limited to, sensory and motor evoked potentials, tests of nerve conduction velocity, and electromyography. These measurements are used in differential diagnosis, pre- and postoperative evaluation of neural function, and neurophysiologic intraoperative monitoring of central nervous system, spinal cord, and cranial nerve function.

b) What are the benefits to the teachers by having knowledge of the cause of hearing loss and their treatment options?

The earlier hearing loss occurs in a child's life, the more serious the effects on the child's development. Similarly, the earlier the problem is identified and intervention begun, the less serious the ultimate impact.

There are four major ways in which hearing loss affects children:

1. It causes delay in the development of receptive and expressive communication skills (speech and language).
2. The language deficit causes learning problems that result in reduced academic achievement.
3. Communication difficulties often lead to social isolation and poor self-concept.
4. It may have an impact on vocational choices.

Vocabulary

- Vocabulary develops more slowly in children who have hearing loss.
- Children with hearing loss learn concrete words like cat, jump, five, and red more easily than abstract words like before, after, equal to, and jealous. They also have difficulty with function words like the, an, are, and a.
- The gap between the vocabulary of children with normal hearing and those with hearing loss widens with age. Children with hearing loss do not catch up without intervention.

- Children with hearing loss have difficulty understanding words with multiple meanings. For example, the word bank can mean the edge of a stream or a place where we put money.

Sentence structure

- Children with hearing loss comprehend and produce shorter and simpler sentences than children with normal hearing.
- Children with hearing loss often have difficulty understanding and writing complex sentences, such as those with relative clauses ("The teacher whom I have for math was sick today.") or passive voice ("The ball was thrown by Mary.")
- Children with hearing loss often cannot hear word endings such as -s or -ed. This leads to misunderstandings and misuse of verb tense, pluralization, nonagreement of subject and verb, and possessives.

Speaking

- Children with hearing loss often cannot hear quiet speech sounds such as "s," "sh," "f," "t," and "k" and therefore do not include them in their speech. Thus, speech may be difficult to understand.
- Children with hearing loss may not hear their own voices when they speak. They may speak too loudly or not loud enough. They may have a speaking pitch that is too high. They may sound like they are mumbling because of poor stress, poor inflection, or poor rate of speaking.

Academic achievement

- Children with hearing loss have difficulty with all areas of academic achievement, especially reading and mathematical concepts.
- Children with mild to moderate hearing losses, on average, achieve one to four grade levels lower than their peers with normal hearing, unless appropriate management occurs.
- Children with severe to profound hearing loss usually achieve skills no higher than the third- or fourth-grade level, unless appropriate educational intervention occurs early.
- The gap in academic achievement between children with normal hearing and those with hearing loss usually widens as they progress through school.
- The level of achievement is related to parental involvement and the quantity, quality, and timing of the support services children receive.

Social functioning

- Children with severe to profound hearing losses often report feeling isolated, without friends, and unhappy in school, particularly when their socialization with other children with hearing loss is limited.
- These social problems appear to be more frequent in children with a mild or moderate hearing losses than in those with a severe to profound loss.

Q.2 a) Suggest three factors which could influence pure-tone test results.

Pure-tone threshold hearing sensitivity is the subjective procedure by which auditory sensitivity is determined. In the United States, the American National Standards Institute (ANSI) has established standards for the calibration of clinical audiometers. The output sound pressure level for standard circumaural or inserted earphones, or both, is specified when measured in a standard coupler, referred to as anartificial ear. The artificial ear simulates the impedance characteristics of the average human ear at the plane of the tympanic membrane. The decibel levels used in audiometers for the normal threshold for air conduction can be found in other publications.[5]

To assess hearing loss by air conduction, the examiner determines the magnitude (in decibels) by which the patient's hearing deviates from the 0-dB hearing level (i.e., normal hearing). To determine hearing loss, hearing sensitivity is assessed at octave frequencies between 250 and 8000 Hz. There is increasing interest in assessing hearing between 8000 and 16,000 Hz, but testing in the ultra-audiometric range (10 to 20 kHz) is not routine.

In summary, pure-tone air conduction testing is the initial and critical measurement for subjective hearing loss. The measure provides an indication of the magnitude and configuration of the hearing loss as a function of frequency. However, little differential diagnostic information can be obtained from this description of audiometric configuration because auditory system dysfunction at various anatomic sites may result in similar patterns of loss of sensitivity. Other hearing tests have been developed for the purpose of distinguishing among the various sites of auditory dysfunction.

Bone Conduction.

The primary audiologic tests used to distinguish conductive from sensorineural hearing loss are the comparative measures of air and bone conduction thresholds. The procedure for measuring bone conduction thresholds is similar to that for measuring air conduction thresholds, except that a vibrotactile stimulator transduces the signal, usually coupled to the mastoid of the ear being tested. The diagnostic utility of the difference between air and bone conduction sensitivity is based primarily on two assumptions: (1) that the air conduction threshold is a measure of the function of the total auditory system, both conductive and sensorineural components, and (2) that the threshold for bone conduction is primarily a measure of the integrity of the sensorineural auditory system and is not significantly influenced by the functional status of the external or middle ear. It has been demonstrated, however, that the external ear and middle ear do provide minor, but important contributions to the bone conduction threshold in the normal auditory system.[6] Consequently, some conductive disorders do cause minor, but significant alterations in bone conduction sensitivity because of changes in the contribution of the middle ear to the bone-conducted signal reaching the cochlea.

b) What three factors contribute to bone-conduction response?

Measurement of the motion of the malleus umbo and stapes footplate during bone conduction (BC) stimulation was conducted in vitro in 26 temporal bones using a laser Doppler vibrometer over the frequency range 0.1 to 10 kHz. For lower frequencies, both ossicular sites followed the motion of the temporal bone. The differential motion between the malleus and the surrounding bone was greater than the differential motion of the stapes footplate; both resonated near 1.5 kHz. Different lesions were shown to affect the response: (1) a mass attached to the umbo lowered the resonance frequency of the ossicular vibration; (2) fixation of either the malleus or stapes increased the stiffness and shifted the resonance frequency upward; and (3) dislocation of the incudo-stapedial joint did not significantly affect the ossicular vibration. The sound radiated from the tympanic membrane was approximately 85 dB SPL at an umbo differential velocity of 1 mm/s for low frequencies in an open ear canal and about 10 dB higher for an occluded one; at higher frequencies (above 2 kHz) resonances of the canal determine the response. It was also found that the motion between the footplate and promontory was within 5 dB when the specimen was stimulated orthogonal to the vibration direction of the ossicles than in line with the same. Measurement of the differential motion of the umbo in one live human skull gave similar response as the average result from the temporal bone specimens

Q.3 Write a note on advantages and disadvantages of recorded material and live-voice of presentation during speech testing.

Understanding speech in the presence of background noise is often difficult, even for listeners with normal hearing sensitivity. Although it is particularly more challenging to recognize SpIN for most individuals with hearing loss, some clinical populations with normal hearing thresholds have greater difficulties in such acoustic conditions [Smoorenburg, 1992]. Speech understanding difficulties in noise are reported as the most common reason for consultations in audiology or hearing health services [McArdle et al., 2005]. However, most clinical hearing test batteries typically only include pure-tone audiometry and speech audiometry in quiet condition. The limits of this assessment strategy have been discussed for decades as they generally underestimate speech difficulties in noise.

On the other hand, hearing health professionals have access to an ever-increasing number of speech-in-noise (SpIN) tests for diagnostic, functional evaluation, and/or screening purposes. The speech material varies widely, from digits to non-sense sentences, as well as the type of masking involved (from energetic to informational masking) and test procedures (e.g., adaptive procedure or fixed level).

The use of SpIN tests allows many advantages for hearing-aid adjustment. Furthermore, the interest of the tests has been shown in the early evaluation of presbycusis [British Society of Audiology, 2019] and also for the diagnosis of hidden hearing loss or auditory neuropathy spectrum disorder (ANSD).

On top of time constraints often reported as a reason for not evaluating speech recognition abilities in noise, hearing health professionals may not always have a clear idea of which SpIN test to use. The objective of this study was to provide a review of the available and validated SpIN tests for the adult French speaking population. As there are about 300 million speakers of French in the world, which represents about 4% of the total planet population [Organisation Internationale de la Francophonie, 2018], the relevance of such work appears incontestable. Having a precise idea of the available SpIN tests for the French speaking population may provide some guidance for the clinical practices and the future efforts in test development for that specific population.

When looking at the available SpIN tests, there are different characteristics that need to be considered in order to select the appropriate one for the intended application. The following paragraphs provide a description of these SpIN test characteristics, including their advantages and limitations.

Testing Procedure

Two test strategies are employed for the measures of speech perception in noise abilities. Fixed-level presentation procedures consist of keeping constant the intensity level of both the speech items and the competing noise during the test. In general, the final score obtained is the number of correctly identified speech items, often expressed as a percentage. As speech items stimuli are presented at supra-threshold intensity level, the listening conditions of SpIN tests using fixed-level procedures can be more representative of the ones found in real life, when appropriate levels and signal-to-noise ratios are selected.

For adaptive procedures, the goal is to measure a detection or recognition threshold over the shortest amount of time, without sacrificing accuracy [Leek, 2001]. Compared to the fixed-level procedure, the adaptive procedure does not require as many test items for obtaining the final score and helps avoiding ceiling effects. Some SpIN tests are being presented bilaterally, while others are being presented unilaterally. The results obtained with this latter test condition represent "ear-specific" functions, which might present some advantages over the bilateral testing conditions for diagnostic purposes. On the other hand, results obtained with tests using bilateral presentation may be more representative of the functional listening abilities.

Speech Stimuli

Compared to monosyllabic words, the score obtained with more realistic speech stimuli such as sentences may be more representative of the listener's ability in real-life situations; scores obtained with SpIN tests using sentences as speech stimuli may be influenced by non-auditory abilities such as linguistic and cognitive functions; sentences are also less sensitive to the hearing deficit because of the redundancy of the testing material [McArdle et al., 2005; Wilson and McArdle, 2005]. While some sentence-based tests offer sentences with the same syntactic structure and generated with a limited number of items, other tests offer unrelated sentences of varying length and syntactic structure.

The familiarity of the corpus items also has to be examined when considering any SpIN tests. In comparable acoustic conditions for example, speech intelligibility is higher for familiar than for unfamiliar words. Close-set corpus (reducing the impact of the obsoleteness or familiarity of the speech stimuli on the SpIN test scores) has been used for a long time but is not representative of daily-life speech and phoneme distribution. It is well established that using pre-recorded material is preferable over live voice for the presentation of the speech items when administering SpIN tests [Stach et al., 1995; British Society of Audiology, 2019] and most are available on CD or via internet.

Types of Masking Noise

Energetic and informational masking are essentially the 2 ways that a background noise can affect speech intelligibility. Informational masking occurs when the signal and masker are both audible, but the listener is unable to disentangle the elements of the target signal from a similar-sounding distracter [Pollack, 1975; Brungart, 2001]. One single talker babble or multitalker babble noises are used to create informational masking. The latter include 2 or more talkers and are produced by electronically mixing individual recording of talkers while reading, for example. The number of talkers included in a babble noise influence the magnitude of the masking effect, but this effect does not follow a monotonical trend. Rather, tests including single or multitalker babble noise are presumed to involve informational masking and are believed to provide insight on the higher order auditory processes.

Energetic masking occurs when both the signal and the background noise contain energy in the same critical frequency bands at the same time, and portions of the speech signals are difficult, or impossible, to recognize. SpIN tests including speech spectrum or white noise as a background, are assumed to involve energetic masking.

Masking noises can be categorized as stationary or fluctuant. Stationary noises have a constant intensity over time, while the intensity of fluctuant noises changes over time. Stationary noises may not be representative of the general daily life background noises. However, for reasons of ease of calibration and test processing, the majority of the available SpIN tests includes a stationary noise.

Performance Variables

Another important aspect to consider when selecting a SpIN test relates to its performance variables, which are influenced by its reliability, validity, sensitivity, and specificity. Most tests have been validated for a specific clinical population and for a specific clinical purpose, for example, for hearing screening [Smits et al., 2004] or for the determination of speech perception problems in noise. When administrating a SpIN test, it is important to be sure that it was designed for the population for whom it is being used with.

Availability of normative data is also an important aspect to consider for the selection of a SpIN tests. Normative data allows comparison of an individual test results to that of the normal hearing population. Subject variables are important in the identification of factors that could explain results that deviate from the documented norms.

By having a better understanding of the impact of the test characteristics on the performance, it is possible to customize the hearing evaluation with respect to the needs (e.g., diagnostic and fitness for duty assessment) and personal factors (e.g., attention span and linguistic abilities) of the listener.

Q.4 Write a detailed note on the awareness about the discomfort of loudness in relation to the selection and use of hearing-aid, in both clinical and school settings.

Action to prevent noise-induced hearing loss is necessary, especially because many causes of permanent hearing loss are preventable. The aim of this study is to identify and raise awareness of the effect of loud sounds on hearing and effective ways to protect ears among young adults in Jordan. Using non-probability and convenience sampling, 245 students (113 female and 132 males, aged 21.5 years ± 2.18) from three universities participated in the study and filled the questionnaire completely. The questionnaire consisted of 19 questions targeting hearing health. The answers were analyzed statistically, and comparisons were made using the t-test. Hearing loss was regarded as an important issue by 64.1% of the participants. Among the participants, 58% already suffered from at least one hearing symptom, even though only 9.8% used earplugs to protect their hearing. After receiving information on noise-induced hearing loss, 56.3% were likely or somewhat likely to use earplugs in the future ($p < 0.01$). This indicates that education and knowledge have a strong influence on student attitudes. It is obvious that the awareness of noise-induced hearing loss among adults in Jordan is very low. The authorities, policymakers, media, and educational institutes should recognize their responsibility in raising the awareness of the danger of loud music among young adults. Differences in understanding speech in noise among hearing-impaired individuals cannot be explained entirely by hearing thresholds alone, suggesting the contribution of other factors beyond standard auditory ones as derived from the audiogram. This paper reports two analyses addressing individual differences in the explanation of unaided speech-in-noise performance among n = 438 elderly hearing-impaired listeners (mean = 71.1 ± 5.8 years). The main analysis was designed to identify clinically relevant auditory and non-auditory measures for speech-in-noise prediction using auditory (audiogram, categorical loudness scaling) and cognitive tests (verbal-intelligence test, screening test of dementia), as well as questionnaires assessing various self-reported measures (health status, socio-economic status, and subjective hearing problems). Using stepwise linear regression analysis, 62% of the variance in unaided speech-in-noise performance was explained, with measures Pure-tone average (PTA), Age, and Verbal intelligence emerging as the three most important predictors. In the complementary analysis, those individuals with the same hearing loss profile were separated into hearing aid users (HAU) and non-users (NU), and were then compared regarding potential differences in the test measures and in explaining unaided speech-in-noise recognition. The groupwise comparisons revealed significant differences in auditory measures and self-reported subjective hearing problems, while no differences in the cognitive domain were found. In summary, we could only identify scientific evidence from physiological measurement methods, suggesting that hearing impairment increases listening effort during speech perception (Q1). There was no scientific finding across studies indicating that hearing aid amplification decreases listening effort (Q2). In general, there were large differences in the study population, the control groups and conditions, and the outcome measures applied between the studies included in this review. The results of this review indicate that published listening effort studies lack consistency, lack standardization across studies, and have insufficient statistical power. The findings underline the need for a common conceptual framework for listening effort to address the current shortcomings.

Q.5 a) What is the recommended distance for a microphone to be positioned when assisted by a classroom teacher?

- Overhead microphones provide satisfactory results only in classrooms that are quiet and fairly non-reflective to sound waves. Overhead miking should not be considered in rooms without carpeting or acoustic treatment, or in rooms that have noticeably noisy air handling systems.
- Use a condenser microphone designed for hanging, with either a cardioid or supercardioid polar pattern (such as Shure MX202). Surface or boundary-type microphones should not be mounted directly on the ceiling, because this placement results in hollow, noisy speech and makes echo and feedback problems worse. (See the document Mics on the Ceiling? Shure Says No for a comprehensive discussion of the drawbacks of ceiling miking.)
- One overhead mic can cover two to three rows of students, depending on the distance between rows. Ideally, every student should be within six feet of a microphone.
  - Position the microphones seven to eight feet above the floor, to allow people to walk under them. If microphones must be raised higher (or mounted directly on the ceiling) to prevent tampering, overhead miking should not be considered.
  - Position each microphone two to three feet in front of the nearest row of students to be covered by that mic. Aim the microphone at the farthest row of students to be covered by that mic. This places the farthest talker on-axis to the mic and the nearest talker slightly off-axis to the mic, which roughly equalizes their levels.
- Each overhead microphone can cover an area approximately eight to ten feet wide. Depending on the distance between seats, this accommodates three to four students.
- For best results, connect the microphones to an automatic mixer, so that unneeded microphones are turned off. This reduces pickup of room noise and reverberation, providing clearer sound.

b) The term signal-to-noise ratio has been used often in this study. What does it mean?

In terms of definition, SNR or signal-to-noise ratio is the ratio between the desired information or the power of a signal and the undesired signal or the power of the background noise.

Also, SNR is a measurement parameter in use in the fields of science and engineering that compares the level of the desired signal to the level of background noise. In other words, SNR is the ratio of signal power to the noise power, and its unit of expression is typically decibels (dB). Also, a ratio greater than 0 dB or higher than 1:1, signifies more signal than noise.

Aside from the technical definition of SNR, the way I define it in other terms is by using a comparative. For example, say that you and one other person are inside a large room having a conversation. However, the room is full of other people who are also having conversations. Furthermore, a few of the other individuals also have similar voice patterns to you and the other individual involved in your discussion. As you can imagine, it would be difficult to decipher which person is saying what.

Now suppose the desired signal is essential data with a strict or narrow tolerance for errors, and there are other signals disrupting your desired signal. Again, it would make the task of the receiver exponentially more challenging to decipher the desired signal. In summary, this is what makes having a high signal to noise ratio so important. Furthermore, in some cases, this can also mean the difference in a device functioning or not, and in all cases, it affects performance between transmitter and receiver.

In wireless technology, the key to device performance is the device's ability to distinguish the applied signals as legitimate information from any background noise or signals on the spectrum. This epitomizes the definition of the standards SNR specifications are utilized to set. Furthermore, the standards I am referring to ensure proper wireless functionality, as well.

The Basics of Signal to Noise Ratio Calculations

In basic terms, SNR is the difference between the desired signal and the noise floor. Also, in terms of definition, the noise floor is the specious background transmissions that are produced by other devices or by devices that are unintentionally generating interference on a similar frequency. Therefore, to ascertain the signal to noise ratio, one must find the quantifiable difference between the desired signal strength and the unwanted noise by subtracting the noise value from the signal strength value.

Hypothetically speaking, if your device's radio receives a signal at -65 dBm (decibels per milliwatt), and the noise floor is -80 dBm, then the resulting signal to noise ratio is 15 dB. This would then reflect as a signal strength of 15 dB for this wireless connection. As I am sure you are aware, in terms of connectivity in wireless networks, the experts state a requirement of an SNR of at least 20 dB to say, surf the web. However, the following is SNR requirements versus SNR values:

- 5 dB to 10 dB: is below the minimum level to establish a connection, due to the noise level being nearly indistinguishable from the desired signal (useful information).
- 10 dB to 15 dB: is the accepted minimum to establish an unreliable connection.
- 15 dB to 25 dB: is typically considered the minimally acceptable level to establish poor connectivity.
- 25 dB to 40 dB: is deemed to be good.
- 41 dB or higher: is considered to be excellent.

Although SNR is routinely in use to quantify the clarity or strength of electrical signals, it can also apply to any form of signal (transmission). For example, it is in use to describe isotope levels in ice cores, biochemical signaling between cells, or audio sound clarity for car amplifiers and source units (DVD, CD, or Digital). However, with audio components, the SNR is always a positive value. For example, an SNR of 95 dB, means that the level of the audio signal is 95 dB higher than the level of the noise. Which, in turn, means that an SNR of 95 dB is better than one that is 80 dB.