DEVELOPMENT OF A MANUAL ON COUNSELLING

FOR INDIVIDUALS WITH SUBJECTIVE TINNITUS

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A Dissertation Submitted in Part of Fulfilment of the Degree of

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Manasagangothri, Mysuru – 570 006

August, 2022

CERTIFICATE

This is to certify that this dissertation entitled '**Development Of A Manual On Counselling For Individuals With Subjective Tinnitus**' is a bonafide work submitted in part fulfillment for the degree of Master of Science (Audiology) of the student with Registration Number 20AUD005. This has been carried out under the guidance of the faculty of this institute and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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CERTIFICATE

This is to certify that this dissertation entitled '**Development Of A Manual On Counselling For Individuals With Subjective Tinnitus**' has been prepared under my supervision and guidance. It is also certified that this dissertation has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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DECLARATION

This is to certify that this dissertation entitled '**Development Of A Manual On Counselling For Individuals With Subjective Tinnitus**' is the result of my own study under the guidance of Dr. P. Manjula, Professor of Audiology, Department of Audiology, All India Institute of Speech and Hearing, Mysuru, and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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August, 2022

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PROLOGUE

The American National Standards Institute (ANSI,1969 as cited in Jastreboff, 2004) defines tinnitus as “the sensation of sound without external stimulation”. The Committee on Hearing, Bioacoustics, and Biomechanics (CHABA) report tinnitus facts, theories, and treatments and proposes another standard definition, which describes tinnitus as the conscious experience of sound that originates in the head (McFadden, 1982). It is also defined as sensation resulting from malfunction of the cochlea or auditory nerve (Jastreboff, 1990; Møsller, 1984).

Tinnitus is estimated to affect 10% to 15% of people worldwide (Sindhusake et al., 2003). Tinnitus affects about 2% of the adult population in Sweden (Andersson, 2002). Tinnitus was detected in 102 of 1420 youngsters in Berlin who had their hearing tested (Aust, 2002). Tinnitus affects 32 percent of the US population, with 6% experiencing severe tinnitus, according to the National Center for Health Numbers; however, there are no comparable statistics for the Indian population. Temporary tinnitus is a highly frequent condition among persons of all ages, according to epidemiological research (Coles, 1996). Noise exposure, head trauma, various otologic issues, medical diseases, and ototoxic chemical exposure are among the most often recognized causes of tinnitus. While just 0.5 to 2 percent of the population is affected by tinnitus, several studies suggest that 6-30 percent of the population suffers from continuous tinnitus (Coles & Hallam, 1987; George & Kemp, 1991). Distress, irritation, emotional pain, sleep issues, and impairment with daily activities are all criteria that distinguish persons who only have tinnitus from those who require

medical assistance. The majority of tinnitus prevalence studies have been carried out in Western Europe or the United States, and they have considerable limitations, particularly in terms of methodology. This methodological flaw is frequently linked to a clear description of tinnitus and the formulation of precise epidemiological questions. Tinnitus is the third most common clinical symptom that people face, accounting for 20% of cases, second only to pain and dizziness. Tinnitus is claimed to become more common as people become older, and the number of people who need treatment is thought to be greater than the number of people who need it. Tinnitus of the subjective kind is generally distressing, with a reported prevalence of 7 to 20% in society and a 20-year incidence rate of 13% in adults over the age of 48. Tinnitus affects around 5% of the patients significantly, with sleep disruptions, attention issues, anxiety, and depression being among the most common symptoms. Among the morbidities that affect the elderly. Tinnitus is a symptom that has clinical significance. Tinnitus affects around 15% of the general population and roughly 33% of the elderly. Tinnitus is a frequent clinical condition that affects around 40 million people in the United States, with 10 million of them suffering from severe cases.

Pulsatile tinnitus affects 0.09 % of Indian population (Paulose et al., 2021). Paraganglioma (25 percent), superior semicircular canal dehiscence (20.3%), anterior inferior cerebellar artery loop (7.8%), sigmoid sinus wall dehiscence (10.9 percent), sigmoid sinus diverticulum (6.25 percent), jugular bulb anomalies (7.8%), and hyperpneumatised petrous apex (3.1%) are among the pathologies leading to pulsatile tinnitus. Rare causes such as IgG4 disease, far advanced otosclerosis, vestibular aqueduct dehiscence and idiopathic intracranial hypertension. Tinnitus is estimated to affect 16.81 percent of geriatrics with otological disorders and among that 60.9% of the people with tinnitus are males and 39.1% are females (Thirunavukkarasu &

Geetha, 2013). Tinnitus affects 5.24 percent of pediatric population (below 18 years) between July 2012 and June 2013 who visited AIISH, Mysore (Thirunavukkarasu & Geetha, 2015).

Tinnitus is manly classified into two categories: objective and subjective. Sounds or noises that can be heard by others as well as the patient, with or without the use of a stethoscope or other noise-amplifying instrument, are referred to as objective tinnitus. Objective tinnitus is referred to as "pseudo-tinnitus," "vibratory," or "extrinsic." It can be caused by vascular problems or muscle anomalies, such as middle ear or palate spasms. They are found in less than 1% of people who have tinnitus as their primary complaint. The neural impulse corresponding to tinnitus that are present in the auditory cortex in subjective tinnitus may have been generated by a pathology in the brain or later in the auditory pathway. Tinnitus that originates in the cochlea or later stages of the auditory system is referred to as subjective tinnitus. According to Henry et al. (2011), the tinnitus signal engages the autonomic nervous system and the limbic system, causing tinnitus sufferers' irritation.

Other classifications include: -

Neurological Tinnitus - Tinnitus produced by a neurological illness such as multiple sclerosis or acoustic neuroma that disrupts the brain's auditory functioning.

Somatic Tinnitus - Tinnitus associated with the sensory system is known as somatic tinnitus this form is caused, worsened, or otherwise related to the sensory system. Tinnitus that is usually triggered by bodily movement or contact. Muscle spasms in the ear or neck, as well as other mechanical causes, can cause it.

Based on the nature of tinnitus –

- Pulsatile Tinnitus - Disorders or abnormalities in the blood veins and arteries, particularly those near the ears, are common causes of pulsatile tinnitus. Aneurysms and arteriovenous malformations are examples of anomalies or diseases that can cause a shift in blood flow across the afflicted blood vessels, example glomus tumor.
- Intermittent Tinnitus – Meniere's disease
- Continuous Tinnitus – Otosclerosis, Acoustic neuroma, acute noise trauma.

Tinnitus can be caused due to variety of reasons, some of them are otologic causes like wax, CSOM, presbycusis, noise trauma, ototoxicity, vascular tumors of middle ear. Non – otological causes such as disease of CNS, anemia, arteriosclerosis, hypertension, hyperglycemia, epilepsy. Neurological disorders such as multiple sclerosis, head trauma such as traumatic brain injuries, skull fracture, closed head I injury, whiplash injury, giant cell arteritis. Metabolic disorders like thyroid diseases, hyperlipidemia, vitamin B12 deficiency, iron deficiency. Psychiatric disorder such as depression and anxiety and various other conditions leading to tinnitus includes Lyme disease, sleep paralysis, benzodiazepine withdrawal, hypnagogia, fibromyalgia, tension myositis syndrome, and vasculitis.

Tinnitus can be extremely bothersome for a small percentage of these people, and it can even have negative consequences for their quality of life, such as sleep disturbances, communication problems, anxiety, irritability, concentration problems, depression, or, in the most extreme cases, suicidal thoughts or actions. Tinnitus can have a variety of consequences in a person's life. Although no two people may have

the exact same problem, the most common effects include difficulties concentrating, emotional outbursts, and sleep disruption. Emotional responses are common tinnitus side effects. For instance, inability to concentrate might result in irritation and hostility. Many tinnitus sufferers claim that their tinnitus appeared out of nowhere. Tinnitus is a brand-new sound. The new sound might be unexpected, and it originates from within the head, which draws our attention. Tinnitus will hold one's attention if it is seen as a danger. Tinnitus might be seen as a threat if it evokes fear of a major medical or psychological illness. Tinnitus causes many patients to worry that they "have a brain tumor" or "are going insane." The more one thinks about tinnitus, the more it becomes an issue. Another reason tinnitus might become an issue is a lack of control. Even those with moderate tinnitus feel unable to manage or escape it, leading to frustration, anger, and discouragement.

Available managements for tinnitus:

- Tinnitus retraining therapy
- Tinnitus habituation therapy
- Cognitive behavioural therapy
- Medications
- Surgical approaches for neurological problems

Tinnitus retraining therapy (TRT):

Tinnitus is a neurophysiological notion in TRT that is based on two fundamental elements of brain function: plasticity and the brain's natural tendency to limit reactivity to irrelevant stimuli and any experience induced by them. As a result, after the negative associations with the tinnitus signal have been eliminated, gradual habituation should occur.

TRT is made up of two main components.

- Tinnitus retraining counseling
- Sound therapy

Retraining counseling:

TRT includes retraining counselling, which is a vital and necessary component. By explaining the elements of the neurophysiological model of tinnitus, patients are encouraged to recategorize their tinnitus as a neutral or moderately negative signal. The major goal is to demystify tinnitus, comfort patients, and reduce unpleasant tinnitus associations. It explains how to teach patients about the hearing mechanism, the fundamentals of brain function, and the particular of the neurophysiological model of tinnitus.

Sound therapy:

TRT always involves sound treatment, even though instruments aren't usually used. Sound treatment, which weakens the tinnitus signal, aids tinnitus habituation. In practise, this is achieved by giving the patient advice on how to stay out of quiet areas and how to enhance background noise or situations by employing table-top sound machines or, more commonly, wearable sound generators. For patients with serious hearing loss, hearing aids increases the richer background sound.

Tinnitus retraining therapy has numerous advantages, one of which is that it is fully non-invasive. Following therapy, there are changes in tinnitus reaction, tinnitus awareness, and the specific everyday activities that were previously avoided or affected. TRT takes roughly 18 months to have noticeable results. After such a long

duration of treatment, some patients do not achieve adequate results. TRT needs patience and discipline from the patient as well as well-educated, experienced specialists (Bartnik et al., 2001).

Need for the study

The overall goal of counseling is to educate the individual with tinnitus about his or her tinnitus condition, to begin tinnitus habituation, and, finally, to neutralize the participant's negative emotional associations with his/her tinnitus, there is a necessity of providing guidance and awareness regarding the counseling for both clinical population and budding clinicians as well.

As there are several techniques for management of tinnitus, the clinicians will be confused as to which technique is effective and how to proceed. This study will aid clinicians in better understanding the importance of counselling in the management of tinnitus. The manual also facilitates the counselling process by providing simple layman-friendly situations / parables to overcome the perception of tinnitus among its sufferers. The reference for this manual is the one that is prepared by Jastreboff et al. (2004). The present study includes additional illustrations/ information and parables to aid in counselling an individuals with subjective tinnitus.

Aim of the study

Development of a manual on counseling for individuals with subjective tinnitus.

Objectives of the study

To prepare a manual on counseling for individuals who are suffering from tinnitus.

CHAPTER 2

REVIEW OF LITERATURE

As the present study aimed at developing a manual on counseling for individuals with subjective tinnitus, the review is covered under the following headings:

1. Information in general about subjective tinnitus and hyperacusis
2. Reasons for bothersome tinnitus
3. Available management options for tinnitus
4. Why is TRT more efficient among all other management options

1. Information about subjective tinnitus and hyperacusis:

According to definitions of hyperacusis, it is the exceptional intolerance to common environmental sounds (Klein et al., 1990) and the constantly excessive or inappropriate responses to sounds by an individual (Vernon, 1987).

There is a dearth of studies published on the epidemiological data on hyperacusis. In Poland, Fabijanska et al. (1999), conducted a postal survey on tinnitus that included an unspecific question on hyperacusis. 15.2% of the 10,349 responders experienced hyperacusis (12.5 % of males, 17.6 % of females). Additionally, regional variations were noted. Andersson et al. (2002) looked into the frequency of hyperacusis in the adult Swedish population. Two techniques were used: a postal population research and an internet study in which users of a Swedish broadsheet newspaper's website were asked to respond to an online questionnaire. A few viewers (595 of the 1167) people who clicked on the online banner answered, representing a response rate of 52%. The postal group included 987 people, 589 of whom answered (response rate 60%), and the point prevalence was 8%. According to research done on

young adults, children and teenagers who engage in risky activities like exposing themselves to loud noises and wearing headphones while listening to loud music run the risk of developing auditory issues including hearing loss, tinnitus, or hyperacusis (Chung et al., 2005). Since young people are more likely to develop hyperacusis, it is crucial to assess the condition in this demographic. However, there is no accepted, impartial approach for evaluating hyperacusis. Most people with hyperacusis will have normal hearing thresholds (Anari et al., 1999)

It has been generally observed that sensations of hyperacusis and complaints of tinnitus overlap or co-exist. When tinnitus is the predominant complaint of a patient visiting a tinnitus clinic, hyperacusis is claimed to be common in roughly 40% of cases (Sood et al., 1998) while tinnitus is reported to be common in 86 percent of cases (Anari et al., 1999). The apparent connection has generated speculation regarding typical processes (Andersson et al., 2001).

A common cause of chronic hearing loss, tinnitus, and hyperacusis is loud music and recreational noise (Pienkowski, 2021). The majority of affected patients have no underlying medical conditions, and the aetiology and natural causes of hyperacusis are mainly unknown. However, there is a significant overlap between tinnitus and hyperacusis, which is why numerous studies have proposed potential shared causes (Baguley, 2003). In a five-year prospective analysis of tinnitus patients, it was shown that the prevalence of concomitant hyperacusis rose from 38% to 85% (Andersson et al., 2001). Tinnitus and hyperacusis in humans are frequently characterized by hyperactivity in the medial olivocochlear efferent pathway (Sturm & Weisz, 2015).

2. Figuring out why tinnitus becomes bothersome

According to research, learning more about your tinnitus might help you manage with it better. The more you learn, the higher are the chances of reducing the impacts of tinnitus (Sirois et al., 2006).

The experience of hearing sound that is not being created by an external sound source is known as tinnitus. Tinnitus is a symptom of an underlying illness or condition rather than a disease. Tinnitus as a symptom is mentioned in ancient Egyptian manuscripts as early as 668 B.C.E, long before loud sounds were popular. Tinnitus has been around for a very long time, yet we have only recently accumulated more knowledge about it. However, there are still a lot of unanswered questions about tinnitus.

Tinnitus is described by its pitch and loudness. The tinnitus sufferer can be instructed to change the frequency and intensity of a pure tone or narrow band noise until it matches the pitch and loudness of their tinnitus, respectively. The loudness of tinnitus has been measured and determined to be quite quiet. However, it is frequently perceived as an extremely loud noise. This is owing to the fact that it is internal noise that does not behave like external noise. This makes it difficult to compare tinnitus with other noises.

Tinnitus is highly widespread, according to studies that attempted to quantify how many people had it. Tinnitus is always present for roughly 13% of persons. One out of every eight persons falls within this category. Tinnitus is ubiquitous all around the world, according to studies conducted by numerous organizations. According to these findings, at least 10% of individuals suffer with tinnitus. Older persons may have greater rates, whereas children may have slightly lower rates. This indicates that

tinnitus affects almost 700 million individuals worldwide (Hoffman et al., 2004). Manche et al. (2016) did a study in south Indian population to see if there is a relationship between tinnitus and hearing loss in various ear related disorders and found that tinnitus was found in 29.3 % of the total study individuals, with an increased prevalence in those over the age of 40. Tinnitus risk increased significantly with middle and inner ear disorders. It was discovered that 96.9 % of the individuals with tinnitus had hearing loss. The most frequent otological conditions that cause tinnitus are otitis media (60.9 %), presbycusis (16.6%), and otosclerosis (14.3%). Tinnitus was found to be strongly related with a higher degree of hearing loss in patients with chronic suppurative otitis media (CSOM).

Tinnitus is a symptom, not a sickness or a condition. There are a variety of variables that might raise the likelihood of developing tinnitus. These variables may not directly cause tinnitus, but they can provoke it. Tinnitus is caused by hearing loss, which is the most common risk factor. Tinnitus does not occur in everyone who has a hearing loss.

Tinnitus can be caused by factors other than hearing loss. Long-term exposure to loud music/ noise, the natural ageing process, muscular strain, blood circulation difficulties, adverse effects from medicine, head trauma, jaw problems, ear wax, hereditary factors, ear infections, or certain illnesses are some of these risk factors.

When tinnitus initially appears, most individuals feel upset, but the amount of annoyance quickly diminishes. Some people have/ experience tinnitus, but it is not a problem for them, i.e., experiencers. Others are bothered or suffer from tinnitus. According to studies, the majority of persons with tinnitus are unaffected by it, and only a small percentage (10 % - 20 %) are severely impacted. Tinnitus severely

affects just 1% to 3% of the population, implying that only 1% to 3% of the population is severely afflicted.

Tinnitus loudness and annoyance are not necessarily connected, according to research. In fact, once people realize that tinnitus does not have to interfere with their everyday lives, they begin to notice the tinnitus less and the annoyance associated with it begins to fade. However, if tinnitus is recognized as an issue, it attracts greater attention.

Hearing certain noises might cause a strong emotional reaction, such as fear or a sense of danger. Tinnitus patient may feel fearful or concerned when he/she become aware of the nerves firing in your hearing system. As a result of this reaction, these seemingly random noises take on significance. Worry or fear might cause you to become more conscious of the random sound in our hearing system. When the brain recognizes tinnitus as a problem, it does not simply dismiss it. Instead, it concentrates on our tinnitus. These emotions may be activated when we hear tinnitus. This aggravates the tinnitus. Hearing tinnitus is associated with negative emotions and thoughts regarding the tinnitus in our brain. This focuses even more attention to the tinnitus, making it appear much louder. If a person has been affected by tinnitus in the past, such as when sleeping or reading, their attention will be drawn unconsciously to the tinnitus when they return to the same setting. The situation becomes much more difficult to handle, and the bad feelings linked with tinnitus are amplified. This sets off a negative loop in which the tinnitus persists or worsens, causing distress.

Tinnitus can become a persistent condition due to a variety of circumstances. These includes thoughts about tinnitus, tinnitus is a sign that something is seriously

wrong, tinnitus can lead to hearing loss, tinnitus will deteriorate, tinnitus will be too much for us to bear.

There are certain problems associated with tinnitus such as Tinnitus interferes with sleep, concentration, and headaches, and so forth. Due to tinnitus, one may avoid doing things like reading or going out, or tinnitus may limit one's life in some other manner.

Emotional responses that can be activated when hearing tinnitus David et al., (2013).

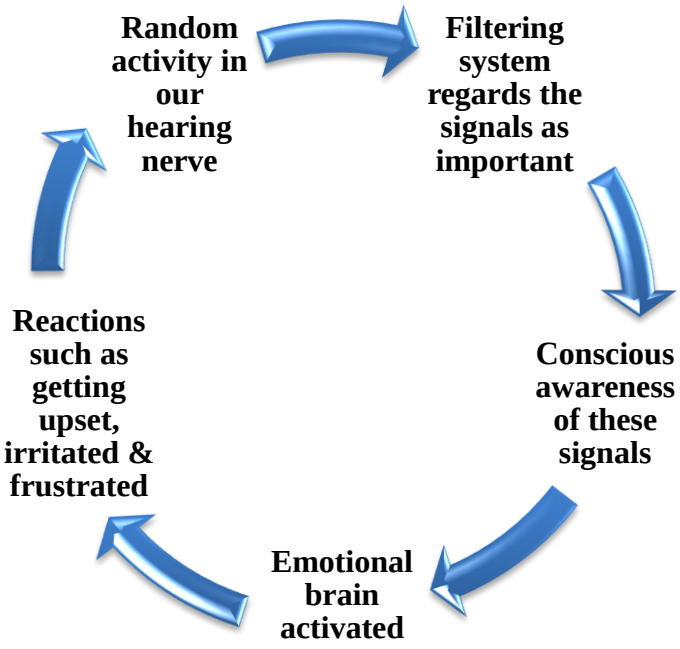


Figure 2.1: Stages in development of tinnitus

Beukes et al. (2021) did a study to see the way in which the covid pandemic affected people with tinnitus and what factors were involved in that. Despite the fact that the trial was directed at those with pre-existing tinnitus, seven people experienced COVID-19-induced tinnitus. COVID-19 symptoms aggravated tinnitus in 40% of respondents, had no effect in 54%, and relieved tinnitus in 6% of respondents. Other

mediating variables like as the pandemic's social and emotional effects made pre-existing tinnitus more annoying for 32% of respondents, especially for females and younger individuals, improved for 1%, and had no effect on tinnitus for 67%. Self-isolation, loneliness, bad sleeping habits, and a lack of exercise all worsened pre-existing tinnitus. Increased melancholy, anxiety, anger, and financial concerns all had a role in making tinnitus more irritating during the pandemic. Tinnitus might be more annoying for those who are lonely, have less social connections, and are concerned or worried.

Geocze et al. (2013) found that individuals along with tinnitus have a high prevalence of depressive symptoms, but the processes through which depression and tinnitus interact are not well known. Bhatt et al. (2017) found that anxiety, sadness, shorter sleep duration, and more days lost from work are all linked to tinnitus. To properly manage individuals with persistent and bothersome tinnitus, It is important to recognize and treat these comorbidities and consequences.

Chu et al. (2020) claimed that tinnitus patients were more likely to acquire Alzheimer's disease and Parkinson's disease. Crönlein et al. (2016), suggested that chronic tinnitus patients experience increased sleeping difficulties and related sleep anxieties or unpleasant feelings. Insomnia is linked to tinnitus-related suffering.

Hiller and Goebel (2006) attempted to determine the degree to which the two key components of tinnitus severity that is the loudness and annoyance, are influenced by tinnitus history and etiology and found that tinnitus loudness and annoyance were shown to have some amount of correlation. Tinnitus that lasted 12 months or less had a greater impact on irritation than on loudness, but tinnitus that lasted more than 5 years had the opposite effect. Subjects with simultaneous hearing loss, vertigo, and

hyperacusis experienced greater loudness and annoyance. Hyperacusis had a far higher effect on irritation than on loudness.

3. Available management options for tinnitus:

Several options are available for management of tinnitus and a few of them are described briefly. Based on the evidence-based practices it is proved that a few options such as TRT and CBT are better than others. Grewal et al. (2014) did a systematic review on the clinical effectiveness of CBT and TRT for treating subjective tinnitus and found that tinnitus can be treated with either cognitive behavioural therapy or tinnitus retraining therapy, although neither approach are demonstrably superior.

3. A. Tinnitus Self – Treatment

Tinnitus is a disease in which the level of suffering caused by the symptoms is largely determined by how much care and attention the individual gives to it. Anxiety and over attention produce physical and mental strain, which causes the auditory centers to improve their selectivity in the brain for supposedly significant or frightening noises, such as tinnitus, resulting in a vicious cycle. This, in turn, leads to more worry, and so on. This cycle, on the other hand, can typically be stopped and reversed, either by proper therapy or through the natural process of habituation to a continuing experience.

Most patients with tinnitus will benefit from explanatory counseling combined with ‘patient expectation nurturing’, a phrase used by Tyler et al (1999), to describe the fostering of the expectation of recovery and explained by Tyler et al. (2001). Tinnitus may go away completely in a small number of people. However, this should

not be held up as a therapy goal because most people will be disappointed. Instead, the goal of treatment is for the tinnitus to become less bothersome, even if the patient can still hear it if they listen for it.

Kaldo et al. (2007) found that tinnitus suffering can be decreased by using a self-help book along with weekly therapy sessions. Seventy-two patients were randomly allotted to receive either a self-help book and seven weekly phone conversations, or a wait-list control condition, with the self-help book and less therapist support later. The Tinnitus Reaction Questionnaire (TRQ) was the primary outcome measure, which was supplemented by daily tinnitus ratings as well as sleeplessness, anxiety, and depression assessments and finally found that guided self-help can considered as an alternative way to administer CBT for tinnitus. The relevance of weekly therapist interaction has been questioned by preliminary data. The impact size was slightly less than with traditional CBT, but self-help appears to be far more cost-effective.

Jernelöv et al. (2012), considered the efficacy of a behavioural self-help therapy for co-morbid and primary insomnia with or without therapist instruction and found that participants who received self-help for insomnia saw a significant improvement. Self-help, especially when accompanied by a therapist, has the potential to be as successful as individual therapy at a cheaper cost, even for those with co-morbid issues.

Morawetz (1989) done a controlled evaluation for insomnia therapy based on behavioural self-help. According to the findings, the self-help tape is a clinically successful and cost-effective treatment for people who do not use sleeping medicine.

If the tape is to be entirely helpful for those who take sleeping pills, it appears that it will need to be accompanied with professional help.

3. B. Progressive Tinnitus Management (PTM)

The programme uses five different stages of treatment to address tinnitus. Most people simply require a rudimentary understanding of how to treat their problem. Therapy becomes longer-term and more rigorous as the levels rise. In addition to sound generators, patients who require higher levels of treatment may also use tinnitus masking techniques or cognitive behavioural therapy. Guided visualisation, deep breathing, or other relaxation techniques may be beneficial for patients at different degrees, as well as increasing their participation in enjoyable activities they do like.

Zaug et al. (2020) suggested that future studies should focus on overcoming obstacles to PTM implementation and addressed a few such as awareness among mental health providers of their potential role in tinnitus management, improve coordination of tinnitus-related care among health care disciplines. Henry et al. (2017) did a study and concluded that PTM is efficient at lowering functional distress brought on by tinnitus in clinical settings. Even though the effect sizes were minimal, they show that PTM is effective for patients even when cognitive behavioural therapy is only used occasionally.

3. C. Lifestyle Changes For Tinnitus Self-Management

Before lifestyle adjustments can be recommended, variables that contribute to the severity of tinnitus must be recognised for each patient**.** Usual questionnaires used are Tinnitus Severity Index (Meikle et al., 1995) which examines the negative impacts

on patients, State-Trait Anxiety Inventory (IWATA et al., 1998) and a shortened version of the Beck Depression Inventory (Beck & Beck, 1972).

Adjust patient expectations and viewpoint:

Budd and Pugh (1995) found that patients who feel they have no control over their tinnitus are more likely to have severe tinnitus, depression, and anxiety than individuals with tinnitus who believe they have some amount of control over their symptoms and other life events.

It's also crucial, according to Tyler et al. (2001), to give patients hope. Even while there is currently no cure for most types of persistent tinnitus, people can find respite from their symptoms in a variety of ways.

Improve sleep patterns:

Patients with insomnia are more likely to develop severe tinnitus than those who do not have difficulties sleeping (Folmer & Griest., 2000). Folmer (2002) suggested that improvements in sleep habits are frequently linked to a reduction in the intensity of tinnitus.

Reduced anxiety

Folmer et al. (2001) suggested that the degree of tinnitus is linked to the patient's level of anxiety.

Evaluation and treatment of patients with depression:

Depressed people consider their tinnitus to be more severe than non-depressed patients, according to (Folmer et al., 1999). The recommendations state that adult patients should undergo a depression screening (Pignone et al., 2002) if it’s found that the particular individual is under depression.

Break the vicious cycle:

According to Folmer (2002) if physicians can help patients reduce their levels insomnia, anxiety, and depression, the intensity of tinnitus should diminish as well.

Address communication problems:

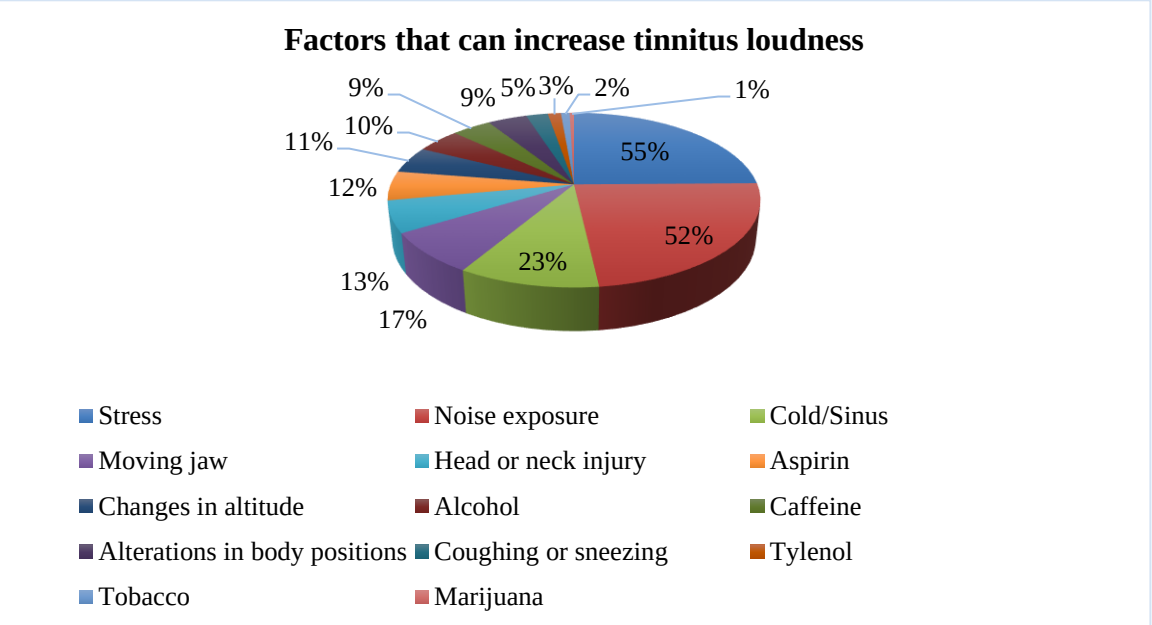
According to Meikle (1997) approximately 90% of tinnitus sufferers have some degree of hearing loss.

Evaluate and make changes to medications:

Dobie (1999) found that there are no drugs that are particularly useful in lowering tinnitus severity. Hearing loss and tinnitus are typical adverse effects of quinine, valproic acid, and furosemide, according to Crummer et al. (2005). The patients should talk to their doctor about switching to a medicine that does not have the same ototoxic potential.

Dietary considerations:

As reported by Oregon Health and Sciences University in 2004 figure 2.2: Factors that can increase tinnitus loudness



Develop personal connections/increase socializing:

Patients who sought social assistance and maintained positive ties with their spouse and relatives experienced less tinnitus-related dysfunction than those who did not have social support or supportive relationships from friends and families, according to Sullivan et al. (1994). Other lifestyle changes which come into consideration according to (Folmer, 2002) rare utilizing acoustic therapy, reducing unprotected noise exposure, desensitizing the patient's auditory system and modifying employment status or responsibilities.

3. D. Tinnitus Habituation Therapy -

The habituation model of tinnitus (Hallam et al., 1984) has been around for over 20 years, and while clear confirmation of its validity is difficult to come by, it has given a valuable framework for conceptualising responses to tinnitus therapy.

It is also feasible to speculate that the automatic monitoring of the tinnitus signal out of awareness will interfere more with the conscious processing of auditory stimuli than of stimuli in other channels, especially when the sounds are similar (Hallam, 1995).

Hallam et al. (1985), using the notion of a cognitive skill, sought to educate tinnitus sufferers to switch their attention (every 20-30 seconds) between tinnitus and external background noises or pleasant mental imagery while in a relaxed state. A few people found this training to be especially beneficial, and a group that only received relaxation did just as well. The training, on the other hand, was brief, and the sample size was modest. Scott et al. (1985), used distraction (in addition to relaxation) to teach self-control, and many later researchers have included attentional control. Patients can do other mental imagery that integrate numerous sensory modalities

rather than switching to other physiological feelings or external noises. Studies by Henry and Wilson (1998) and Eysel-Gosepath et al. (2004), support the idea that switching attention training can be beneficial.

3. E. Cognitive Behavioural Therapy (CBT) With Applied Relaxation –

The use of relaxation in CBT has a long history, and experimental investigations have proven its effectiveness (Öst., 1988). Since early 1980s, people have been effectively using the applied relaxation approach (Lindberg et al., 1984). Although there has been insufficient research on tinnitus to compare the efficacy of different types of relaxation in treating tinnitus, there are some evidences that applied relaxation is somewhat superior to other options like progressive relaxation (Hallam., 1995).

The cognitive behavioural approach to tinnitus management is founded on concepts gained from CBT for various other conditions such as anxiety and depression (Persons et al., 2001), as well as research conducted with patients suffering from somatic conditions such as chronic pain (Philips., 1988) and insomnia (Morin., 1993).

Jun and Park (2013) did a study on CBT based on efficacy and its evidence and found that tinnitus therapy can benefit from CBT. It has insignificant effect on the auditory characteristics of tinnitus, but it does enhance the responsiveness to tinnitus. As a result, CBT is a viable tinnitus therapy approach.

Devesa (2007) did a study to determine if cognitive behavioural therapy is useful in the treatment of tinnitus sufferers and concluded that the subjective loudness of tinnitus or the related depression were not shown to be significantly different. However, a substantial improvement in the participants' quality of life (a decrease in

global tinnitus severity) was noted suggesting that CBT affects the qualitative components of tinnitus and helps favourably to tinnitus treatment.

Fuller et al. (2020) conducted a study to determine the effectiveness and safety of cognitive behavioural therapy (CBT) for tinnitus in adults and found that tinnitus may have a detrimental influence on one's quality of life, and CBT may help to alleviate this. However, there is no evidence after 6 or 12 months of follow-up. There is also some indication that harmful effects in people with tinnitus who get CBT are infrequent, although this needs to be researched further. Although ambiguity exists due to concerns about the quality of the data, CBT for tinnitus may offer a slight extra advantage in lowering depressive symptoms.

3. F. Tinnitus Activities Treatment –

Activities therapy is an extension of information counseling, in which the patient is informed about tinnitus and related issues while also taking into account the patient's general health and proposing suitable coping mechanisms (Tyler & Baker, 1983).

In the majority of cases partial masking sound therapy is combined with activities treatment (Stouffer et al., 1990; Tyler, 2006). A study conducted by Tyler et al. (2021) to see the effectiveness of tinnitus activities along with partial and total masking and found that 8 out of 22 people in the counselling group, 8 out of 13 in the total masking group, and 8 out of 24 in the partial mask group saw meaningful improvements for those without hearing aid. Significant improvements were attained for 5 of 16 patients with hearing aid in the counselling group, 3 of 14 in the total masking group, and 6 of 13 in the partial masking group.

3. G. Hearing Aids and Tinnitus –

Hearing aids have long been thought to be beneficial in the treatment of tinnitus (Saltzman & Ersner, 1947). Total and partial masking treatments have been utilised with them (Hazell et al., 1985; Vernon., 2000; Wedel et al.,1998). In a survey of tinnitus sufferers, 1/3 participants said that getting hearing aids was the most important benefit of going to a dedicated tinnitus clinic (Sanchez & Stephens, 2000).

Hearing aids increase brain activity in the auditory system, which interferes with or competes with the central auditory representation of tinnitus, diverting attention to more complex sounds of higher relevance or interest, such as speech and music (Andersson, 2002).

Trotter and Donaldson (2008) did a study using hearing aids on a 25-year-old tinnitus patient and found that hearing aids can be highly helpful in controlling tinnitus in persons with audiometrically verifiable hearing loss. The extra improvement in tinnitus control shown with the use of programmable digital aids had a cumulative effect on the treatment of these individuals.

Shekhawat et al. (2013), conducted a study to look into the function of hearing aids in the treatment of tinnitus and concluded that hearing aids are recommended for the individuals with hearing loss associated with tinnitus in the majority of research examined. Although some data supports the use of hearing aids in the treatment of tinnitus, improved methodological and randomised control studies are warranted.

3. H. Tinnitus Sound Therapy –

External noises are used in acoustic or sound treatment to offer relief from tinnitus. The logic for acoustic treatment remains the same regardless of which

devices are used. Raise the amount of external noises in the patient's environment to reduce the patient's perception of tinnitus.

Increased external sound exposure (within acceptable limits) can boost blood flow to the inner ear (Quirk et al.,1992). This aids in the nourishment and maintenance of the auditory structure, as well as the healing process.

Suzuki et al. (2016), did a study to see the efficacy of sound therapy in people with tinnitus who have failed to respond to other therapies and found that in patients who had not responded to previous tinnitus treatments, there was an improvement in quality of life as reflected on Tinnitus Handicap Inventory and a satisfactory response to sound therapy utilizing personalized settings.

3. I. Tinnitus Retraining Therapy –

Tinnitus retraining therapy (TRT) recognizes that tinnitus emergence is influenced by multiple brain areas, including the limbic system and the autonomic nervous system (Jastreboff.,1990). The discomfort generated by tinnitus is caused by the participation of various systems, while auditory pathways play a secondary role in these processes. TRT is a type of sound treatment and counseling (Jastreboff & Jastreboff, 2000) that focuses on suppressing or even eliminating tinnitus-related unpleasant reactions and associations, as well as suppressing tinnitus perception.

Henry et al. (2006) performed a study to compare tinnitus masking and tinnitus retraining therapy in a clinical investigation and found that tinnitus masking (TM) and tinnitus retraining therapy (TRT) are both effective treatments for tinnitus relief. In the short term, TM may be more beneficial for patients, but with sustained therapy, TRT may give the best results.

4. Why is TRT more efficient among all other management options.

Bauer et al. (2017), did a study to evaluate treatment results for persistent bothersome tinnitus following Tinnitus Retraining Therapy (TRT) against standard of care therapy (SC) during an 18-month period. SC is defined as a patient-centered tinnitus strategy, standard of care, focused on the individual participant's symptoms and attempted to diminish negative cognitive, affective, physical, and behavioural reactions to tinnitus utilizing environmental sound enrichment. He reported that when paired with hearing aid use, adults with moderate to severe tinnitus and hearing loss were responsive to amplification benefit from either TRT or SC therapy. The benefit of TRT was found to be greater than that of SC. Over an 18-month period, the overall improvement in tinnitus severity appeared to be stable and clinically meaningful.

Korres et al. (2010), did a study to discuss findings on the efficacy of TRT for tinnitus treatment in individuals with clinically significant tinnitus was compared to a group of patients who were given vasoactive medicines, and it was found that sound difference between tinnitus and silent surroundings led to a reduction in tinnitus detection. Tinnitus is perceived differently after receiving directive counselling. The goal of this study was to discuss the findings on the efficacy of TRT for tinnitus treatment in patients with clinically severe tinnitus. Although TRT is not a cure, it helps lessen the amount of annoyance caused by tinnitus and improves the ability of patients to work, sleep, relax, or concentrate.

Formby et al. (2007) checked the secondary benefits of TRT based on loudness discomfort levels and auditory dynamic range expansion and found that TRT therapy had clinically significant results, opening up new avenues for increasing auditory dynamic range and improving sound tolerance in the overall hearing-impaired

population. The mechanism behind these treatment effects plasticity is unknown, however it appears to be compatible with a centrally controlled auditory gain control process.

Lee et al. (2004) checked the effectiveness of directive counseling in tinnitus patients and found that after directive counseling, factors such as loudness, annoyance, and the influence on daily life tinnitus were reduced. In addition, the tinnitus handicap inventory (THI) score was reduced dramatically. Yu- Qing Liu et al. (2018) conducted a study to see if tinnitus directive counseling had any early and long-term impact on chronic primary tinnitus and associated difficulties and found that tinnitus intensity of THI was reduced in short-term observation by tinnitus directive counseling, and tinnitus loudness and its negative influence on mood, sleep, and concentration were also improved in long-term follow-up by tinnitus directive counseling. Tinnitus can be reduced and sleep quality improved by changing bad sleeping patterns. Patients with less severe tinnitus and good sleep habits are more likely to be treated. As a result, tinnitus counseling should cover not just sleep hygiene but also patient compliance. The personality of the patient is significant, and anxious people are more likely to benefit from retraining counselling (Falkenberg & Wie, 2012)

Tinnitus in children has not been well researched too far. In addition, there is no consensus on how to treat tinnitus in young individuals. Tinnitus counselling is the most fundamental technique among the treatment options for tinnitus in children. Lee et al. (2018), did a study to see the importance of counseling in children with tinnitus and concluded that counseling alone or in conjunction with treatment without medication is more likely to improve tinnitus in children. Tinnitus management that

focuses on teaching and counselling rather than medical or surgical therapy should be further improved.

TRT can help with any form of tinnitus, regardless of the cause. TRT consists of two parts: (1) tinnitus counselling based on the neurophysiological concept, and (2) sound treatment (with or without instrumentation). The primary goal of counselling is to categorize tinnitus as a neutral stimulus. The goal of sound treatment is to reduce the loudness of tinnitus. Tinnitus, decreased sound tolerance, and hearing loss must all be assessed and treated. TRT has been proved to be a successful treatment strategy by a variety of organizations (Jastreboff & Jastreboff, 2000).

Tinnitus retraining therapy is absolutely non-invasive, which is one of its benefits. After treatment, changes have been noticed in tinnitus reaction, tinnitus awareness, and the specific everyday activities that had been hindered or impacted before. Tinnitus retraining therapy also has certain drawbacks. It takes a long time because stable effects don't show up for nearly 18 months. Additionally, even receiving such extensive treatment, some individuals still do not achieve satisfying results. Discipline and patience are the two key requirements of TRT from patient and well educated and experienced clinicians are required to conduct TRT effectively (Bartnik et al., 2001).

CHAPTER 3

METHOD

The objectives of the study were to develop an intervention manual on counselling based on retraining for individuals with subjective tinnitus. The study was carried out in two phases. They are:

Phase 1: For information about tinnitus and its many treatment options, several sources of information such as journals, books, and internet websites were reviewed for relevant literature.

Phase 2: The information gathered were prepared and organized in accordance with the requirements of the manual.

Phase 1:

Various sources of information regarding tinnitus, various treatment plans available and retraining counseling for subjective tinnitus were gathered from books, standardized treatment manuals, journals and numerous online resources. All those information was gathered from library and information centre of All India Institute of Speech and Hearing (AIISH), Mysore. The contents for the manual were mainly adapted and combined from different library books. Various literatures were reviewed from different journals available from internet sources. A few of the copyright free images were used for this particular manual from internet sources and special care was made to ensure that all the illustrations suited Indian context and are comprehensible. Special attention was made to ensure that the illustrations and contents in the manual are well suited to the interested layman with reference to tinnitus.

Phase 2:

The various information gathered from these sources was condensed, compiled and organised as required for this manual. Pictures appropriate to the content of the manual were collected and drawn according to the need. Care was taken to make the pictures more interesting, unambiguous, and appropriate for the Indian context.

With all the information collected, a manual consisting of the following content on counselling an individual suffering from tinnitus, was formulated.

I. Explanation about normal hearing

II. Explanation of the parts of the auditory system

- Outer Ear
- Middle Ear
- Inner Ear
- Auditory pathway

III. Explanation of the results of audiological testing

IV. Neuronal Network

V. Auditory Gain

VI. Brain is wider than sky

- Perception
- Limitation of attention
- Brain and its plasticity
- Limbic and autonomic nervous system

VII. The neurophysiological model of tinnitus

- Habituation

VIII. Sound therapy

IX. Medication

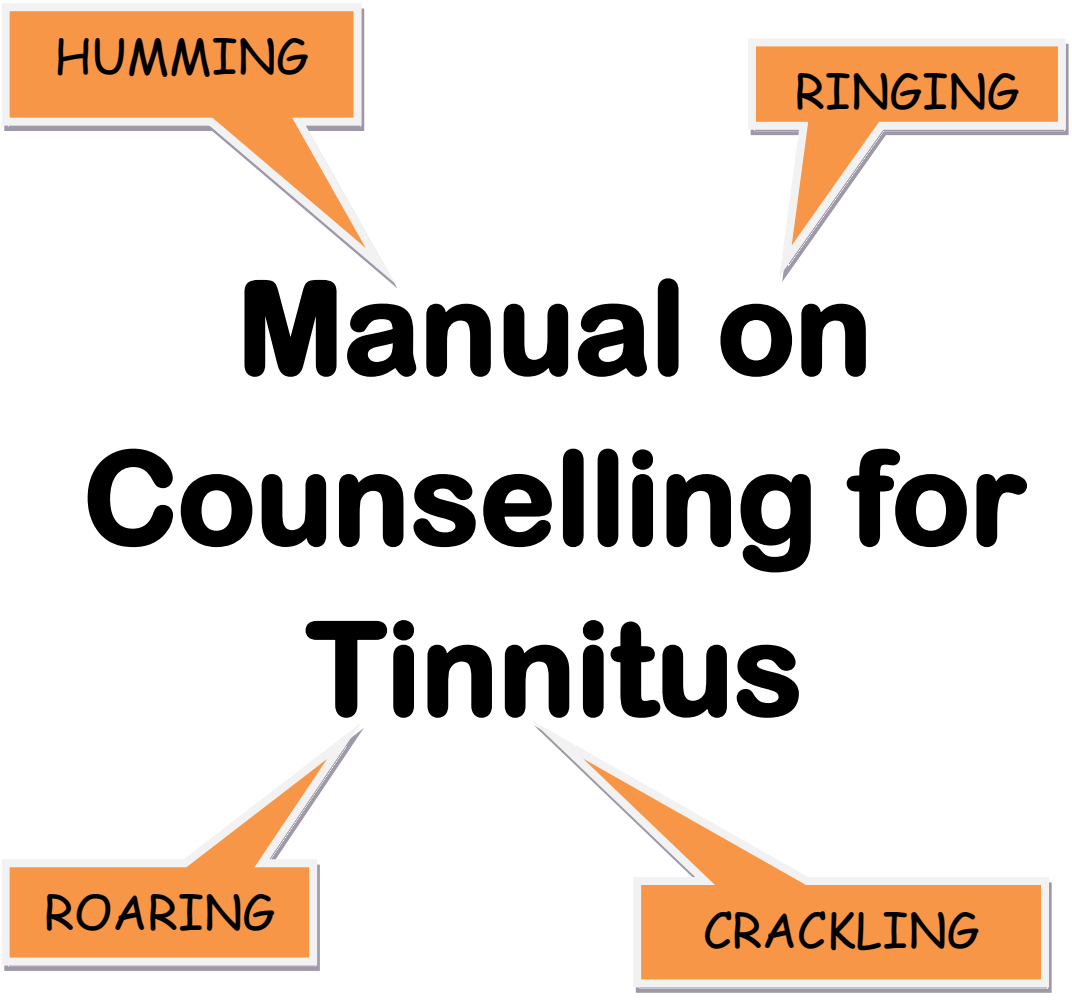
X. Summary

XI. Appendix

- Examples for counseling
- Tinnitus interview form
- Tinnitus follow-up interview

The manual contains recreated pictures collected from various sources and drawn so that they are relevant to each heading. This makes the manual more compact and comprehensible. Certain illustrations for effectively counselling an individual with tinnitus are provided in the form of a manual on counselling in the management of tinnitus.

Chapter 4


HUMMING
RINGING
Manual on Counselling for Tinnitus
ROARING
CRACKLING

A quick overview –

I. Explanation about normal hearing

II. Explanation of the parts of the auditory system

- Outer Ear
- Middle Ear
- Inner Ear
- Auditory pathway

III. Explanation of the results of audiological testing

IV. Neuronal Network

V. Auditory Gain

VI. Brain is wider than sky

- Perception
- Limitation of attention
- Brain and its plasticity
- Limbic and autonomic nervous system

VII. The neurophysiological model of tinnitus

- Habituation

VIII. Sound therapy

IX. Medication

X. Summary

A quick guide to the clinician –

I. Explanation about normal hearing.

II. The basic functions of the auditory system are presented.

III. Explanation of audiological exam findings.

IV. Presentation of basic perception rules, including the effect of contrast on signal strength.

V. Presentation of the fundamentals of brain function and the interactions of various brain systems.

VI. Applying these fundamental notions to the specific patient: explaining why tinnitus and decreased sound tolerance cause such serious concerns.

VII. Explanation of habituation's theoretical basis and how to achieve it.

VIII. Discussion with the patient about the intended treatment(s), including the role and application of sound.

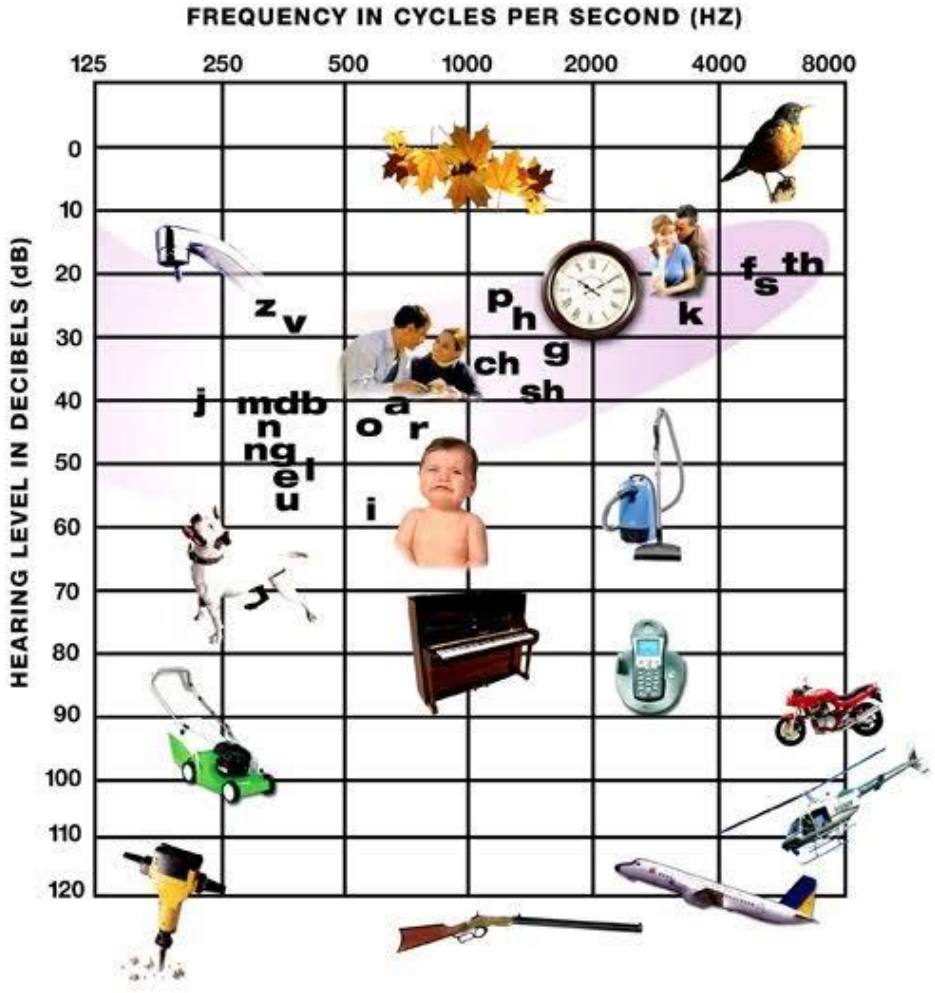
IX. Responding to any additional questions the patient may have based on the neurophysiological.

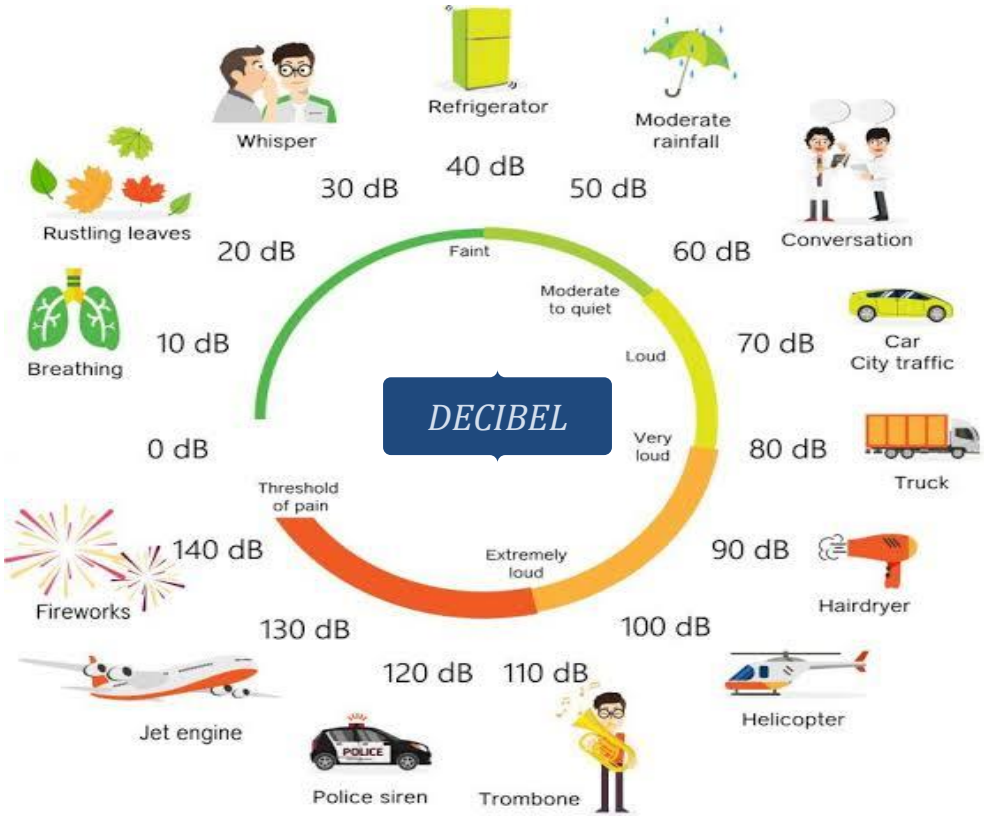
I. What is Normal Hearing!!!???

- The 'normal' hearing frequency range of a healthy young person is about 20 to 20,000 Hz.
- The range for normal hearing is -10 to 15 dB HL from 250 to 8000 Hz.
- Though the audible dynamic range for hearing is 0 to 120 dB SPL, anything above 85 dBA heard for longer duration is deemed harmful.
- Everyday noises and where they are on a decibel scale -

Normal conversation	60 dBA
Commercial area	70 dBA
Traffic noise	85 dBA
Thunder	120 dBA
Fireworks	130 dBA

- Vibrations created by sound waves in the air are picked up by the external ears of humans.
- These vibrations are 'caught' in our middle ear, where they are converted into pressure waves.
- These waves are subsequently sent into our inner ear, or cochlea, where they are transformed into electrical messages that travel along the auditory nerve and the central auditory path way to the auditory cortex.





Reference: pixastock.com-34327192

II. Our Auditory System!!!

Outer Ear → Middle ear → Inner Ear

OUTER EAR -

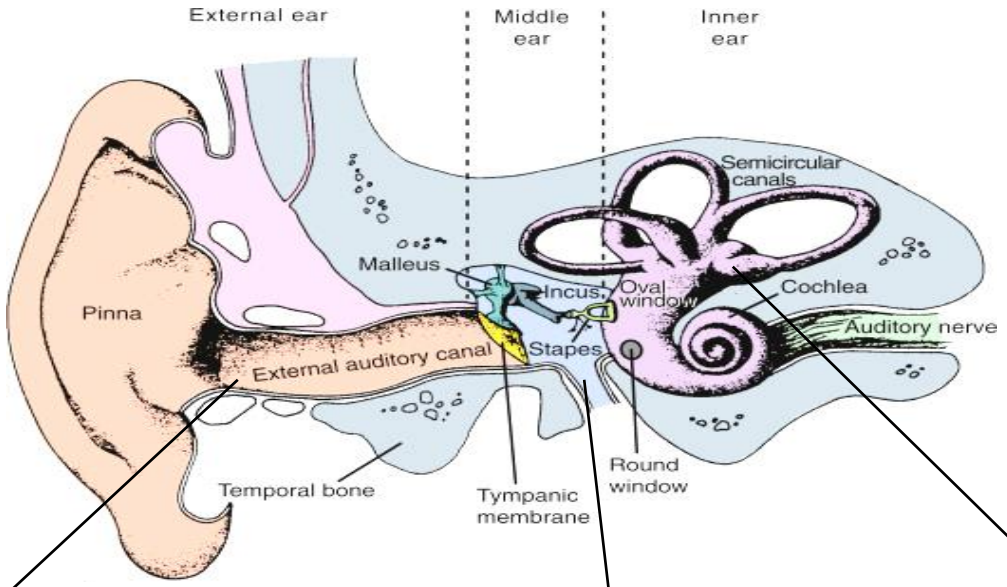
- Collects sound waves
- Channels them into the ear canal (external auditory meatus)

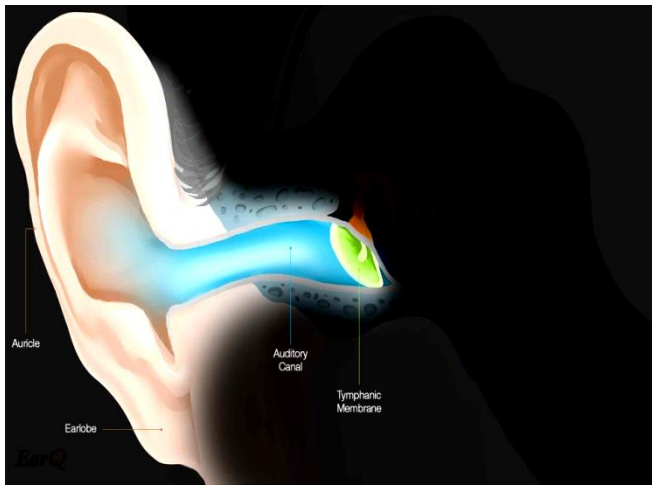
MIDDLE EAR -

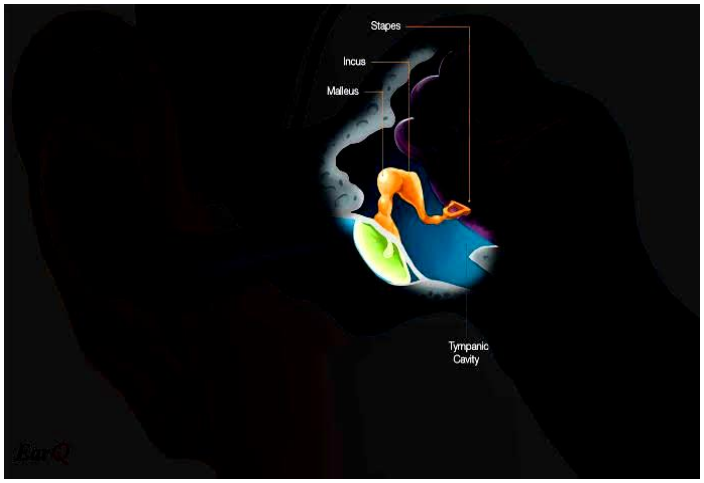
- Consist of Tympanic membrane + middle ear ossicles
- The transmission of acoustic vibrations from the tympanic membrane to the cochlea
- Impedance matching between the air in the external auditory meatus and the labyrinthine fluids
- Protection of the inner ear by means of the acoustic reflex

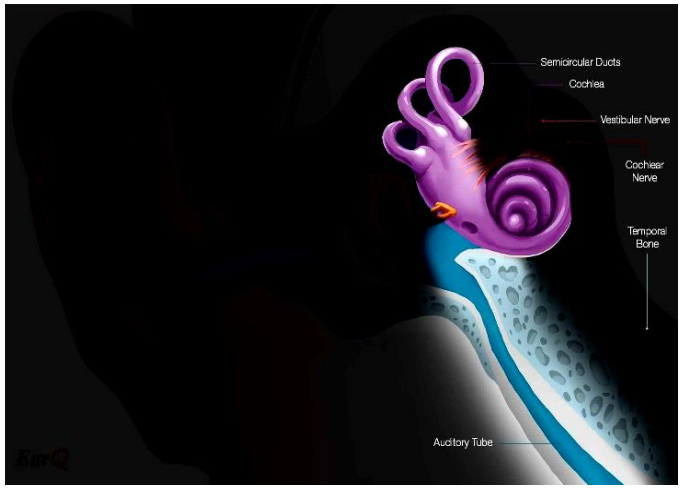
INNER EAR -

- Helps in hearing
- Keep your balance



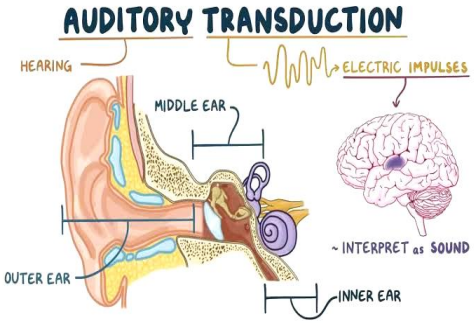






Reference: EarQ

INNER EAR



- Sound wave in the inner ear vibrate the fluid inside & changes into electrical impulses which goes up to the brain.

- **Cochlea –**

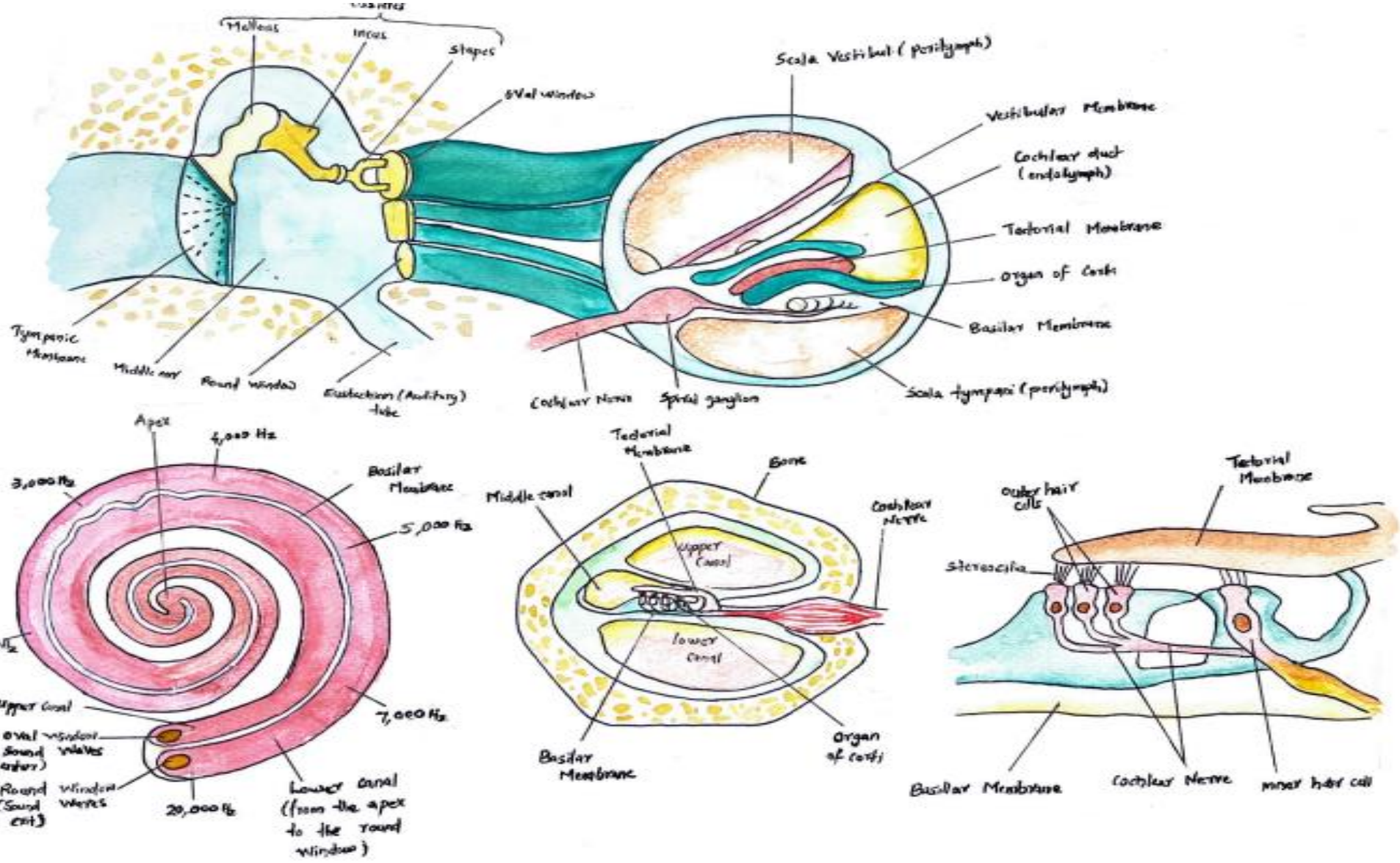
  - Two fluid filled tubes, one inside the other &the inner tube has at the base of it is a membrane which we called basilar membrane.

  - Basilar membrane – highly stretched at the bottom/base of the cochlea so it vibrates to the high frequency sounds such as bird chirping and whistle.

  - Top of the cochlea loosely stretched and responds to the low frequency sounds.

  - Each point of the membrane is going to vibrate to different frequency or pitch.

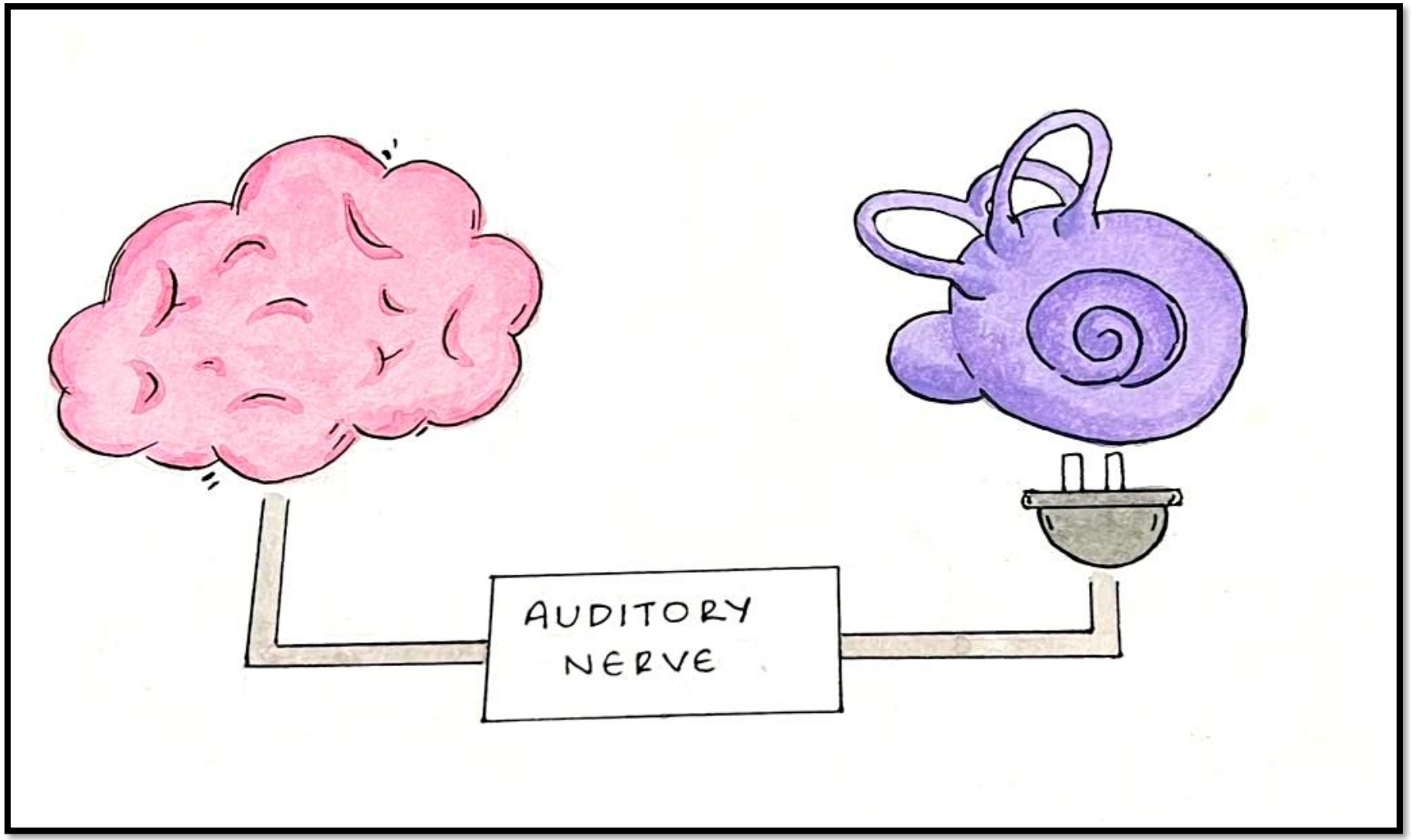
  - The frequency specific nature of basilar membrane tells us the nature of sound.


Malleus
Incus
Stapes
Oval window
Scala Vestibuli (perilymph)
Vestibular Membrane
Cochlear duct (endolymph)
Tectorial Membrane
Organ of Corti
Basilar Membrane
Scala tympani (perilymph)
Tympanic Membrane
Middle ear
Round window
Eustachian (Auditory) tube
Cochlear Nerve
Spiral ganglion
Apex
4,000 Hz
3,000 Hz
Basilar Membrane
5,000 Hz
2,000 Hz
7,000 Hz
Upper canal
Oval window (Sound waves enter)
Round window (Sound exit)
20,000 Hz
Lower canal (from the apex to the round window)
Tectorial Membrane
Middle canal
Bone
Cochlear Nerve
Upper canal
Lower canal
Basilar Membrane
Organ of Corti
Tectorial Membrane
outer hair cells
Stereocilia
Basilar Membrane
Cochlear Nerve
inner hair cell

- Hair cells are the sensory receptors of both the auditory system and the vestibular system. Through mechano-transduction, hair cells detect movement in their environment.

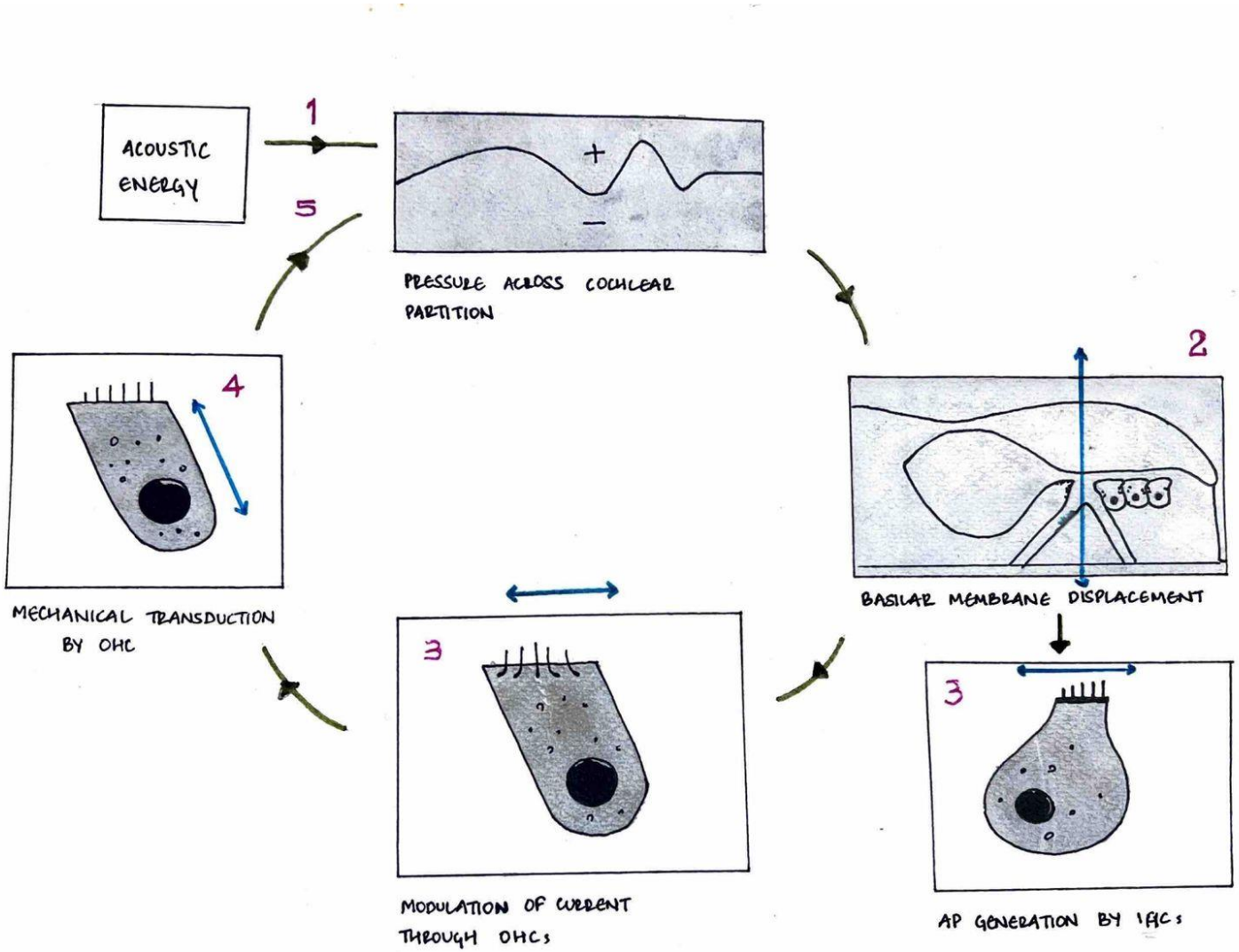
- Two types –
    - Inner Hair Cells (IHC): one row of outer hair cells in the cochlea has been estimated at ~3500 in number.
    - Connected to nerve fibres of the auditory nerve which in turn send signals to the brain.
    - Outer Hair Cells (OHC): 3 rows of OHCs around 12,000 in number.

- There are about 30,000 fibres in the cochlear nerve.


AUDITORY
NERVE

Basilar membrane vibrates to the sound which makes the IHCs to move up and down results in bending of tip of the hair cells.

- Starts electrical impulses within the IHCs & passes into individual fibres of auditory nerves to the brain.
- Soft sound: IHCs of basilar membrane will not get excited, insensitive to such lower sound.
- OHCs vibrate and thus vibration makes enough energy to fire off the IHCs.
- Without OHCs soft sounds are not audible.
- The OHC system has a high level of redundancy, allowing for up to 30% diffuse OHC loss without compromising the audiogram.
- Because of compensation given by nearby healthy hair cells, minor regions of degeneration may not result in observable alterations in the hearing threshold.
- Tiny pockets of OHC degeneration, detectable by DPOAE, may play a substantial role in the formation of tinnitus.


ACOUSTIC ENERGY
1
PRESSURE ACROSS COCHLEAR PARTITION
2
BASILAR MEMBRANE DISPLACEMENT
3
AP GENERATION BY IHCs
3
MODULATION OF CURRENT THROUGH OHCs
4
MECHANICAL TRANSDUCTION BY OHC
5

III. Audiological Testing

The following points has to be explained –

- Interpretation of audiogram
- Speech perception and its frequency range
- LDL’s and its importance
- Dynamic range of normal
- Matched loudness and pitch

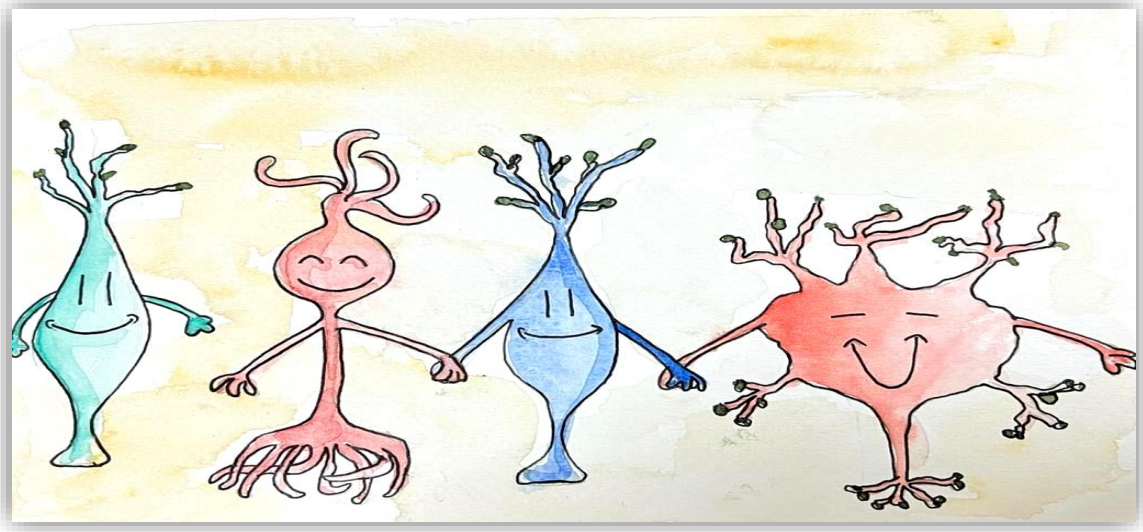
IV. Neuronal Network

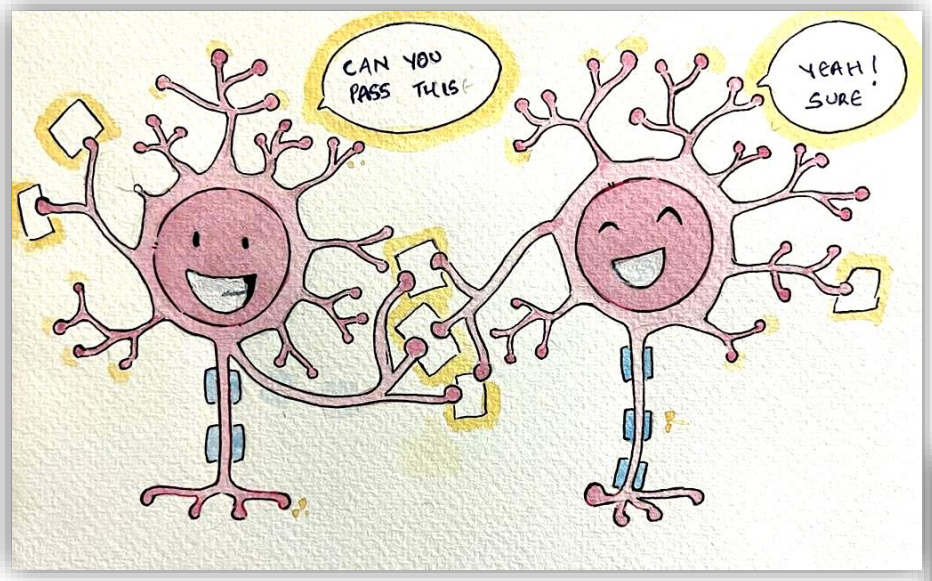
- From the cochlea to the brain, there are several neural routes and are highly complex.

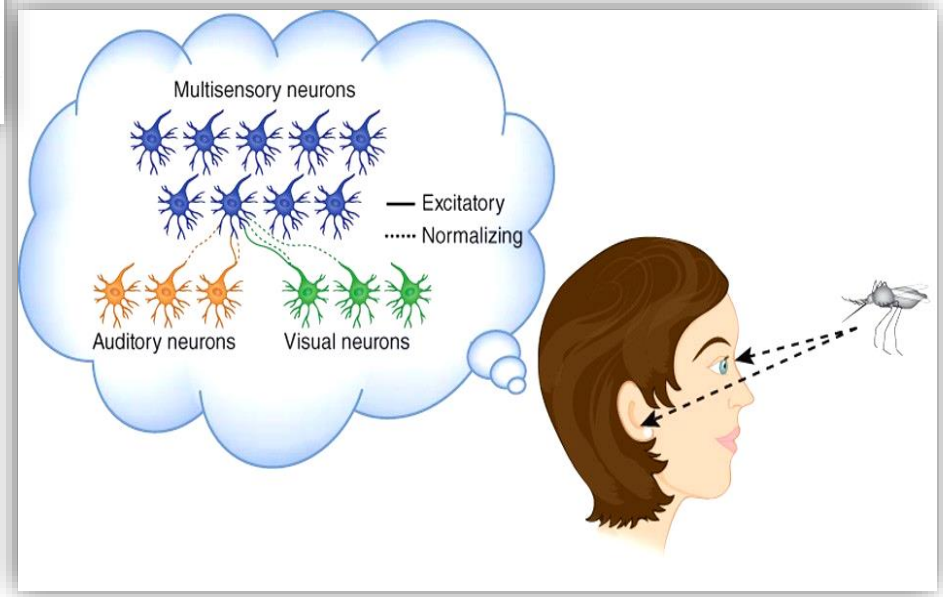
- These neural networks process information, finding key patterns while filtering out and suppressing activity that is not relevant.

- Extensive networks of linked nerve cells accomplish the process of pattern recognition and filtering out extraneous information.

- Neurons can be either excitatory or inhibitory and can enhance or suppress the activity of a target neuron.




CAN YOU PASS THIS
YEAH! SURE


Multisensory neurons
Excitatory
Normalizing
Auditory neurons
Visual neurons

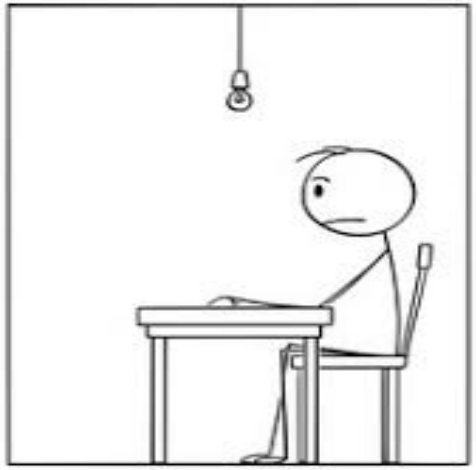
V. Auditory Gain!!!!

A Reason For Tinnitus????

- OHC's act as an amplifier within the cochlea (auditory system is able to control its overall gain).

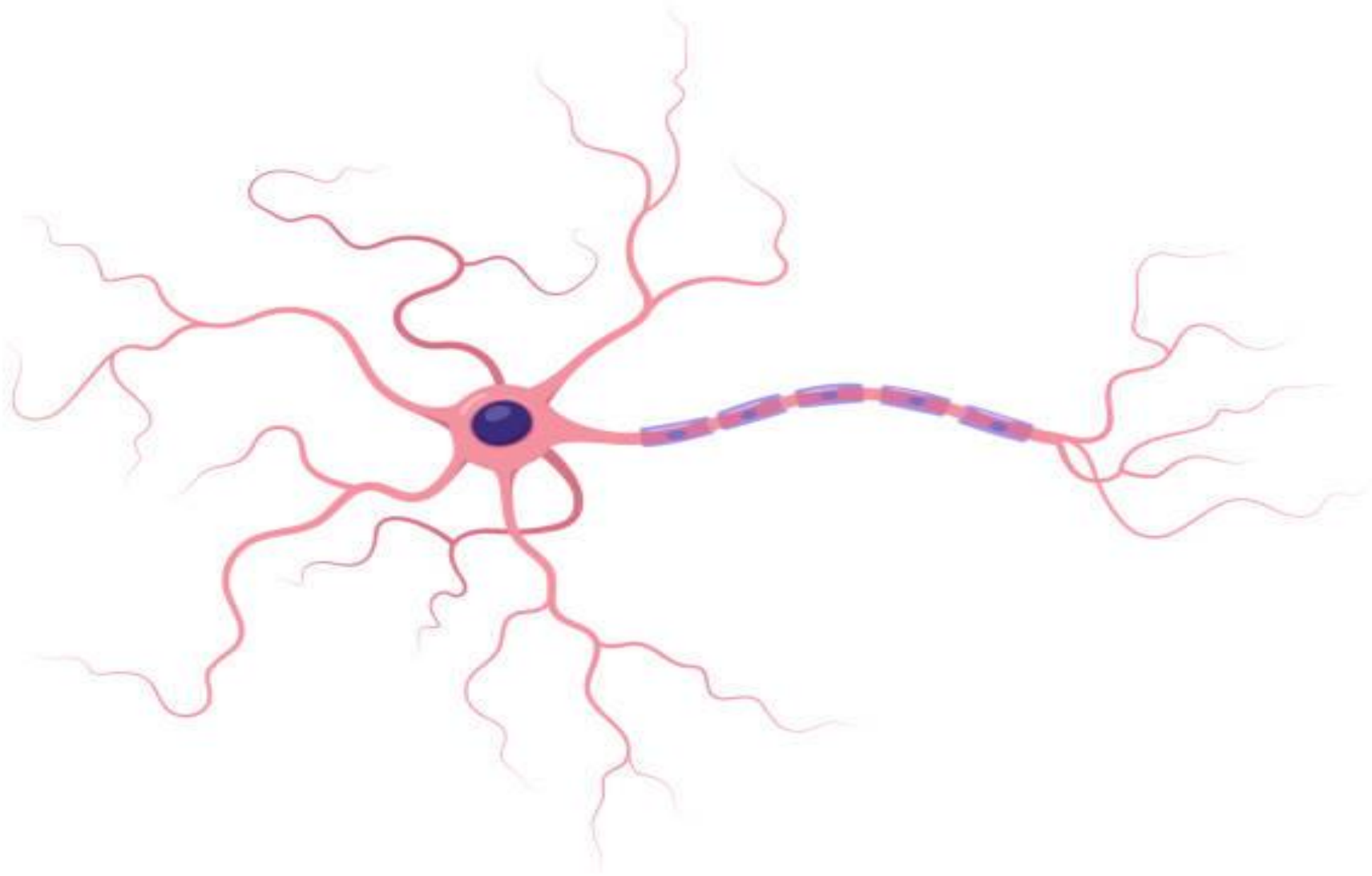
- Experiment by Heller & Bergman in 1953 –
  - 80 normal hearing people without tinnitus
  - Soundproofed room for 5 mints
  - 94% of them experienced tinnitus

- Tinnitus perception is innate to the auditory system and is not always the outcome of a pathological condition.



➢ Physiological Level –

- The auditory nerve fibres' spontaneous neuronal activity has a high rate of 50-100 impulses per second when there is no sound.
- The average activity rises and becomes more regular in the presence of sound.
- The patterns of neuronal activity in the auditory nerve fibres mirror the sound waves that have already arrived in the canal.
- Before reaching the auditory cortex, where sound is eventually experienced, this activity is subjected to intensive processing at multiple levels in the subcortical auditorypathways
- The spontaneous random activity is filtered out as part of this processing, and in normal circumstances, we do not detect this as sound.
- Tinnitus is caused by changes in spontaneous activity within the auditory system as a result of diminished auditory input (gain increases).



VI.“Brain Is Wider Than The Sky”

- Perception –
  - The auditory system can distinguish one complicated pattern from another that appears at the same moment.
  - The training is accomplished by repeated exposure to a sound that has been identified as important.
  - Example: The capacity to hear our own name even when there is a lot of background noise and we aren't expecting it.
- The original signal (tinnitus), once detected and assessed as essential due to its continuous existence, induces neural networks to tune to its pattern, allowing the auditory system to easily distinguish it even when additional signals are present.


HEY
ASWIN


Brain

- The impression of signal intensity, whether auditory, visual, tactile, or thermal, is based on a comparison with the level of the backdrop around it, rather than the signal's absolute physical strength.

- It is possible to make the same signal weaker or stronger simply altering the backdrop.
    - Sound of a car radio being played at a comfortable listening level while driving along a busy street may seem to become uncomfortably loud once the car has been parked in the owner's garage.

- Tinnitus will sound significantly louder while sleeping in a quiet bedroom than when sitting in a busy workplace, even though tinnitus-related neural activity does not alter. As a result, people with tinnitus can expect their tinnitus to be louder in calm environments, which is one of the reasons why they should avoid silence.


8B6X
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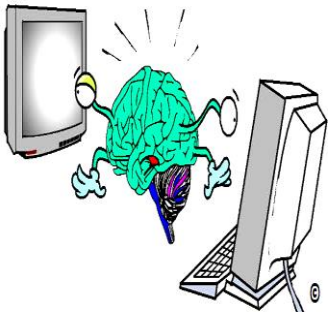
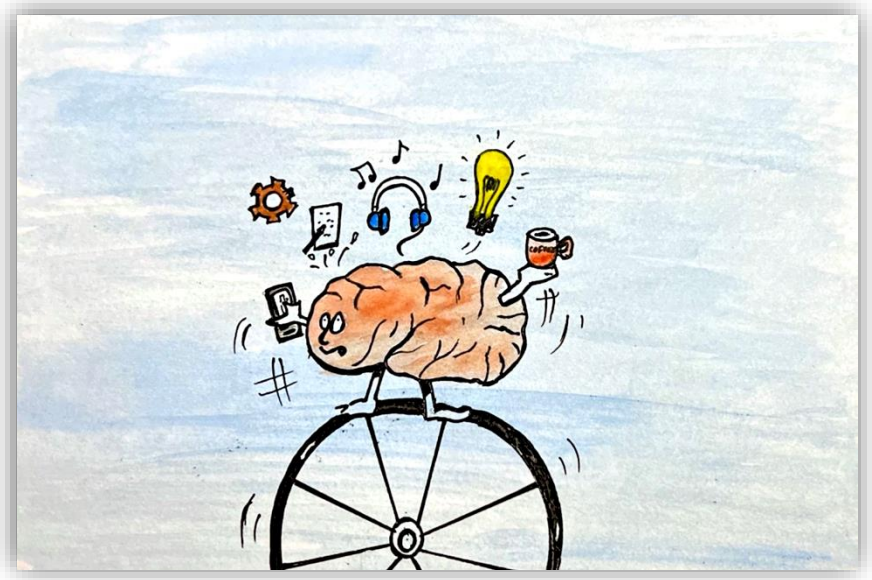
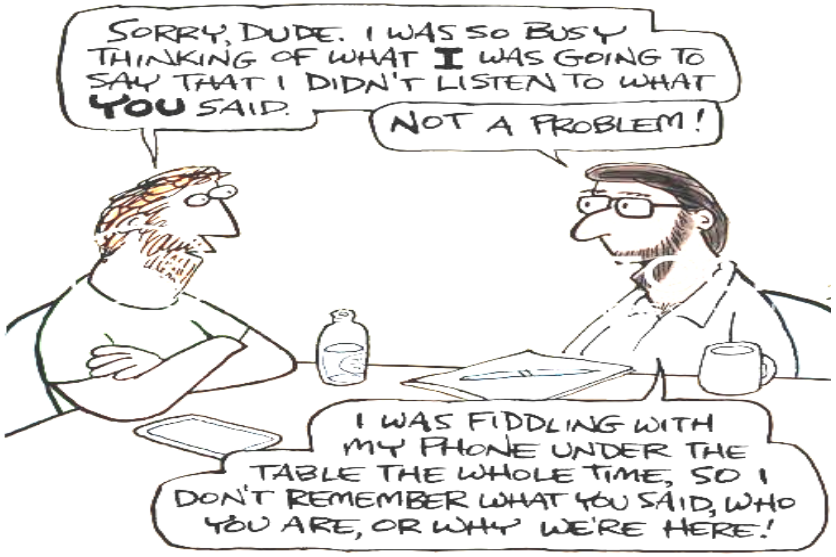
- Attentional constraints –
  - At any given time, the brain is not capable of doing more than one activity that requires complete attention
  - Our brain is capable of completing extremely complicated tasks that even the most modern computers cannot duplicate
  - Example - attempting to read a book while also writing a letter



  - Information is constantly blasted into our auditory system. The cochlea and the subcortical areas receive all sound. At the same time, these centres can analyse and distinguish between a variety of sounds.
  - When faced with a vast volume of information entering at the same time, the brain employs different tactics, as only one task can be placed in the conscious focus at any given moment.




SORRY, DUDE. I WAS SO BUSY THINKING OF WHAT I WAS GOING TO SAY THAT I DIDN'T LISTEN TO WHAT YOU SAID.
NOT A PROBLEM!
I WAS FIDDLING WITH MY PHONE UNDER THE TABLE THE WHOLE TIME, SO I DON'T REMEMBER WHAT YOU SAID, WHO YOU ARE, OR WHY WE'RE HERE!

- Huge number of subconscious conditioned reflexes automates the majority of repetitive activities.

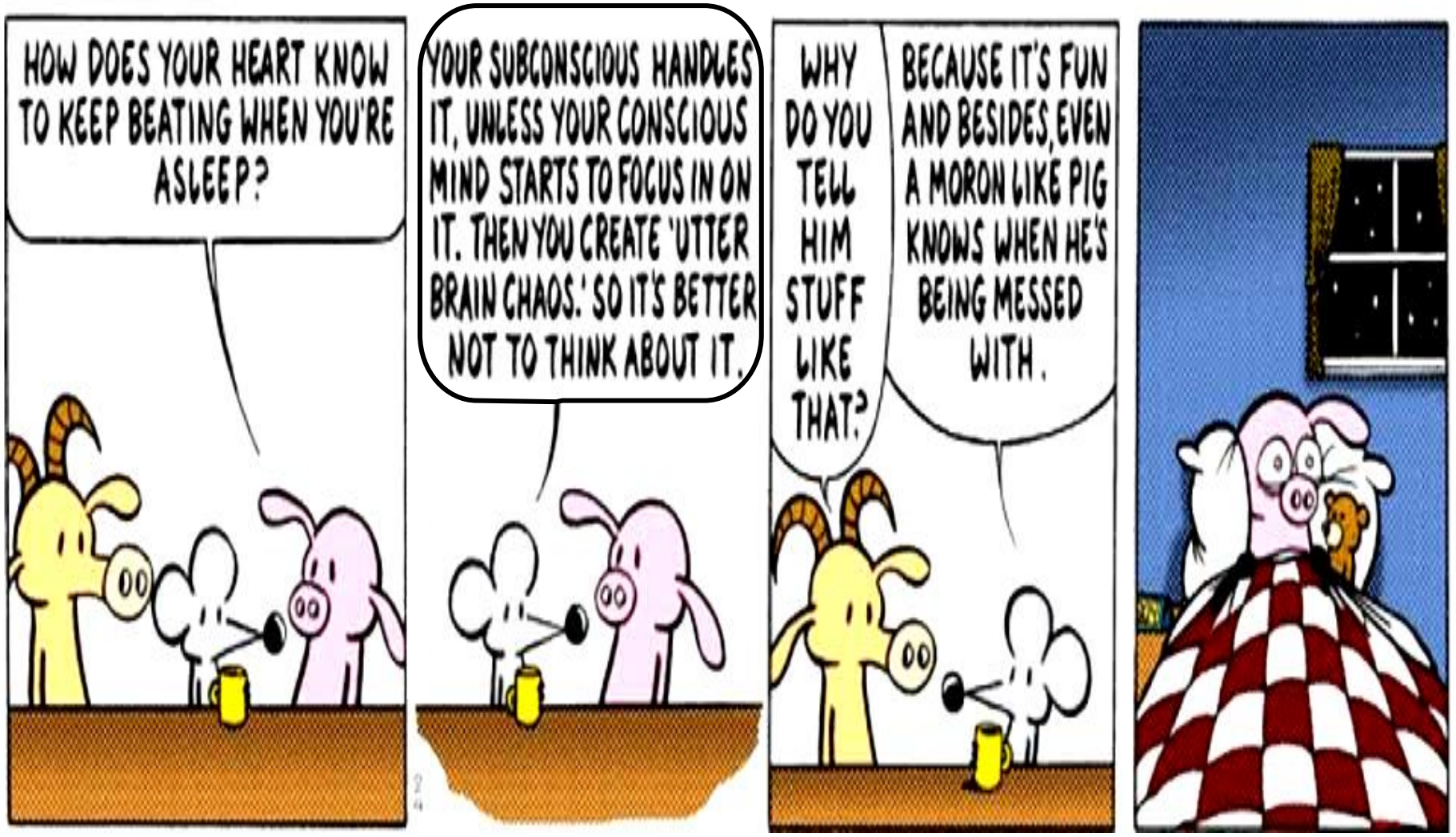
- Strategy 1 - Create a sequence of conditioned reflexes that function at a subconscious level to automate specific reactions that need a consistent and predictable response to the same stimuli.
    - Example- Driving a vehicle while being stimulated our auditory system. We can arrive at our destination while conversing with our passenger without paying conscious attention to it.

- Strategy 2nd – Classification of stimulus
    - Important – requires some action
    - Secondary – not important

- When the same neutral stimulus is presented repeatedly without reinforcement, it loses its ability to elicit a response and we lose awareness of its presence.

- The input still elicits activity in the auditory system's periphery and inside subconscious awareness, but no responses or conscious perception.

- At a subconscious level in the auditory pathway, the signal is suppressed or filtered out, preventing it from reaching the highest level, where it would be noticed.


HOW DOES YOUR HEART KNOW TO KEEP BEATING WHEN YOU'RE ASLEEP?
YOUR SUBCONSCIOUS HANDLES IT, UNLESS YOUR CONSCIOUS MIND STARTS TO FOCUS IN ON IT. THEN YOU CREATE 'UTTER BRAIN CHAOS.' SO IT'S BETTER NOT TO THINK ABOUT IT.
WHY DO YOU TELL HIM STUFF LIKE THAT?
BECAUSE IT'S FUN AND BESIDES, EVEN A MORON LIKE PIG KNOWS WHEN HE'S BEING MESSED WITH.

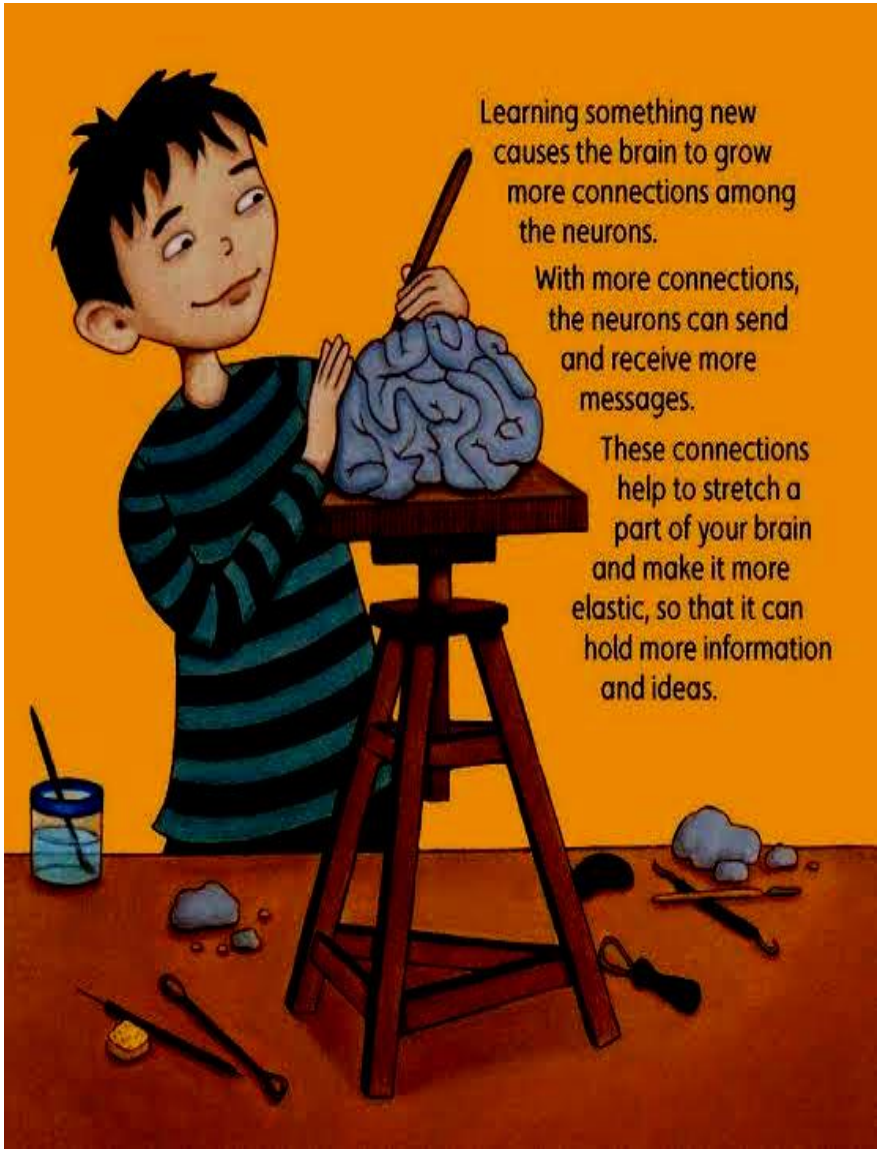
The **BRAIN** that **changes** itself

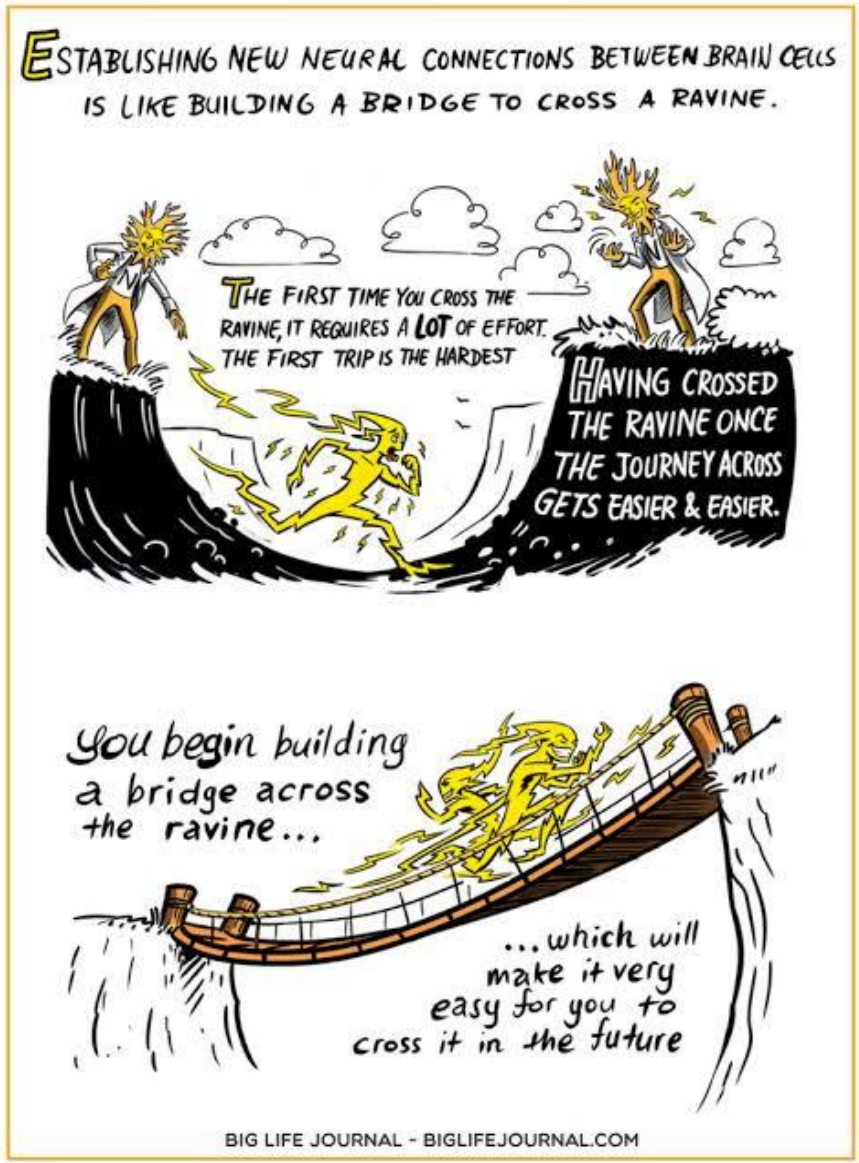
- Learning and creating conditioned reflexes are made possible by the brain's plasticity.

- Changes are brought about by varying the strength of connections between neurons. It takes more time to retrain than it does to learn the first time.

- Exercises are the only way to retrain conditioned reflexes, and it takes time when they are firmly linked to emotions (Negative reinforcement).

- Sub-system of brain –
  - Limbic system
  - Autonomic nervous system

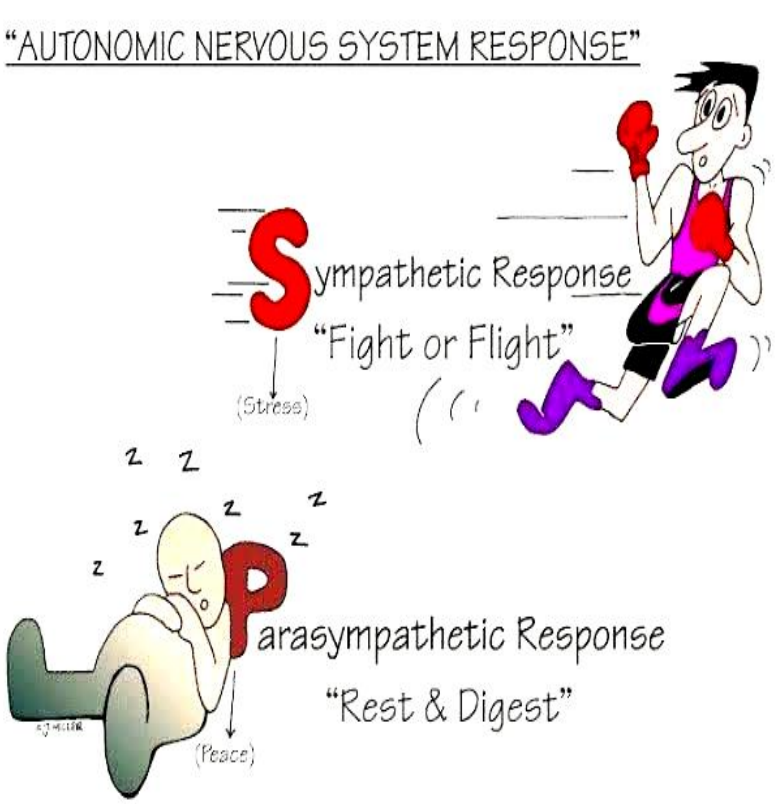

Learning something new causes the brain to grow more connections among the neurons.
With more connections, the neurons can send and receive more messages.
These connections help to stretch a part of your brain and make it more elastic, so that it can hold more information and ideas.

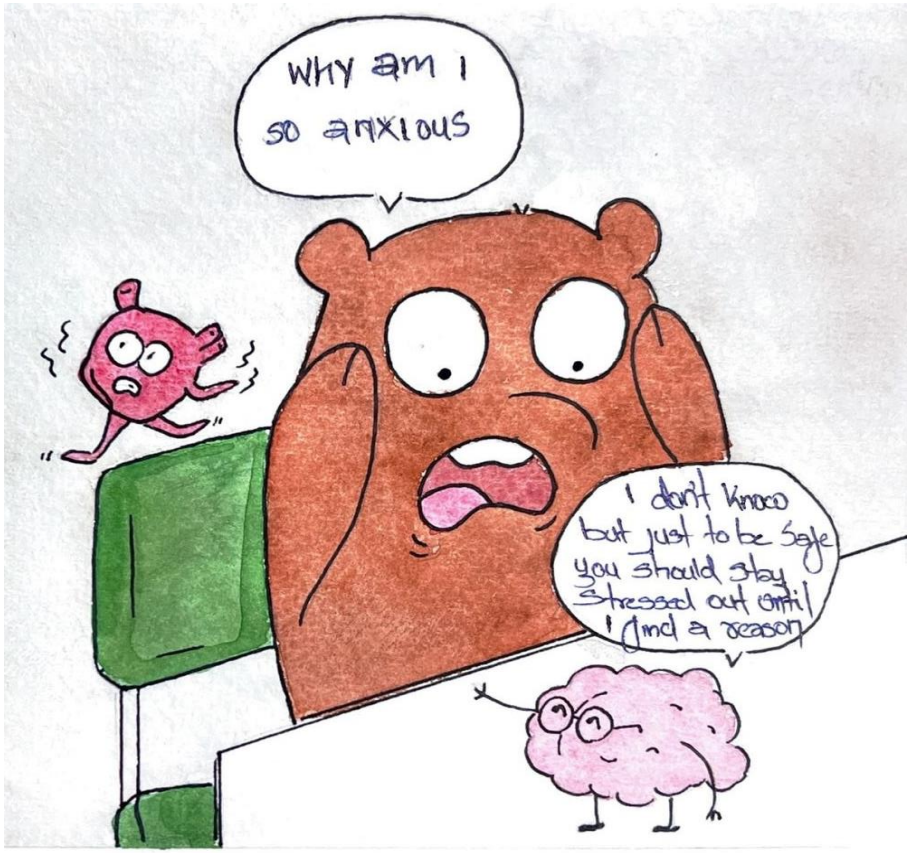

ESTABLISHING NEW NEURAL CONNECTIONS BETWEEN BRAIN CELLS IS LIKE BUILDING A BRIDGE TO CROSS A RAVINE.
THE FIRST TIME YOU CROSS THE RAVINE, IT REQUIRES A LOT OF EFFORT. THE FIRST TRIP IS THE HARDEST
HAVING CROSSED THE RAVINE ONCE THE JOURNEY ACROSS GETS EASIER & EASIER.
you begin building a bridge across the ravine...
...which will make it very easy for you to cross it in the future
BIG LIFE JOURNAL - BIGLIFEJOURNAL.COM

- Limbic system –
    - It is closely linked to the auditory system and regulates emotions.
    - Sound may elicit significant positive or negative emotional reactions with the right training
    - The limbic system must be activated for the learning process to take place, and a lack of limbic activation during auditory stimulation leads to habituation of the sound.

- Autonomic nervous system –
    - The heartbeat, sweating, hormone levels, respirations, and temperature are all controlled by this system.
    - Although we may not have direct control over the autonomic nervous system, we can influence its activity through relatively basic interventions like as exercise and relaxation.
    - When physical or mental activity is required, the sympathetic component of the autonomic nervous system is engaged. Its extended activity, on the other hand, would result in tiredness, tension, and discomfort.
    - Tinnitus signals function as a continuous sensory input, activating the sympathetic component of the autonomic nervous system and maintaining higher-than-normal levels of excitement in this system.

- Tinnitus is only an issue when the limbic and autonomic nervous system reflexes are activated.


"AUTONOMIC NERVOUS SYSTEM RESPONSE"
Sympathetic Response
"Fight or Flight"
(Stress)
Parasympathetic Response
"Rest & Digest"
(Peace)


Why am I so anxious
I don't know but just to be safe you should stay stressed out until I find a reason

VII.Neurophysiological model of tinnitus

1. Is tinnitus really bothersome??

   - The sound is not connected with any negative meaning in 80 percent of people who are experiencing tinnitus for the first time, and it goes through a phase of spontaneous habituation.

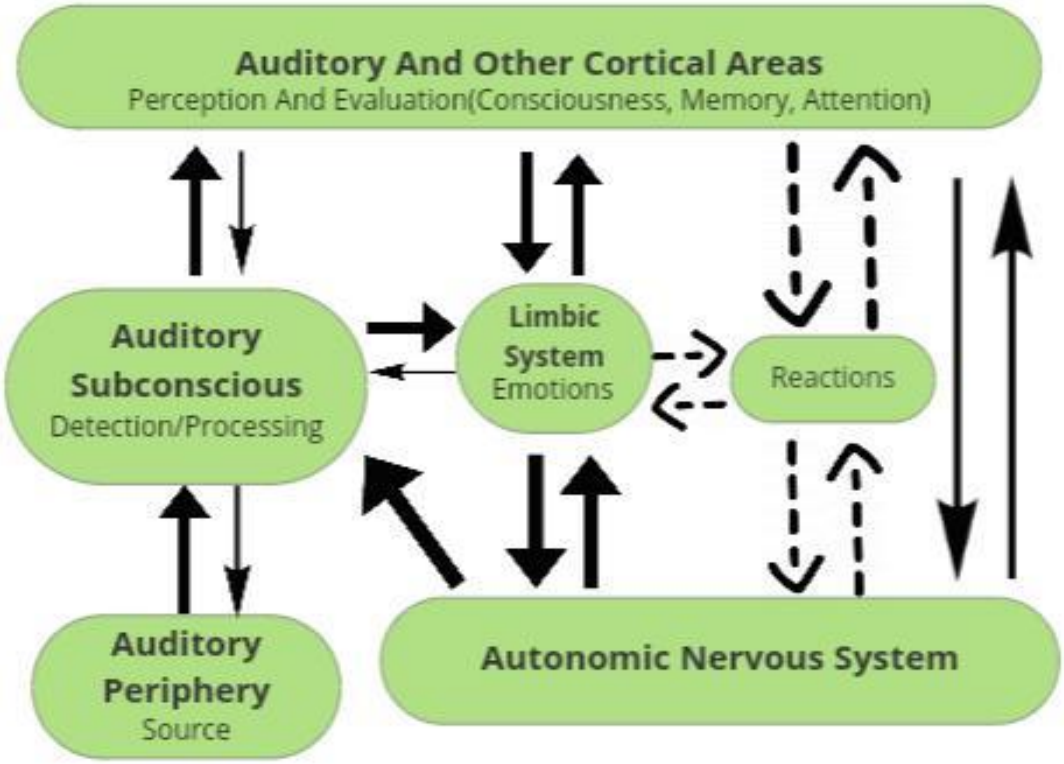
   - Like a sound from a new refrigerator or any other electronic device.

   - People experiences annoyance or anxiety towards tinnitus for the first time, which leads to increased activity in the autonomic or limbic systems; tinnitus then becomes a clinically significant condition.

   - Increased detection of tinnitus causes the limbic and autonomic systems to become even more activated.

   - The sympathetic part of the autonomic nervous system is activated, and this causes a number of specific changes in body functions, which are reflected in behaviour.

   - Patients have a harder time staying asleep than falling asleep.



Activation of various systems evoked by a new sound. The thickness of the arrows represent the strength of activation.

2. Do I have a severe tinnitus???

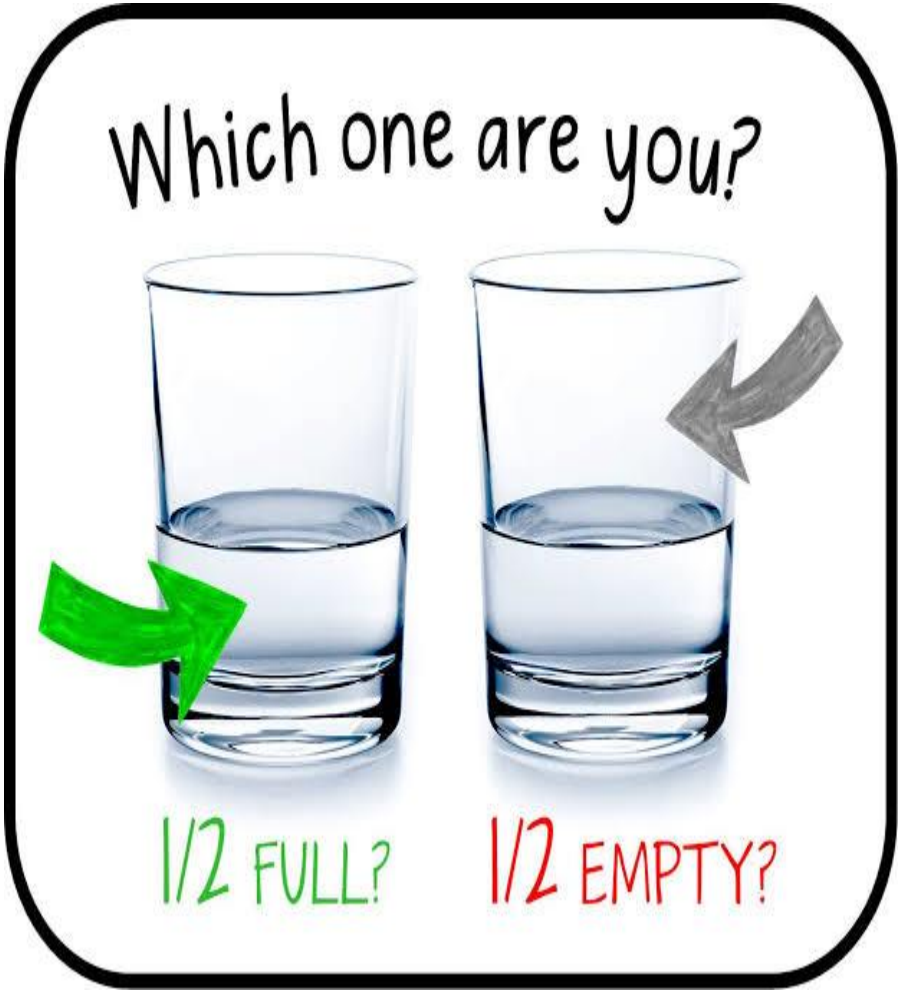
- Depends on the level of autonomic nervous system activation, not on what is going on in the auditory pathways.

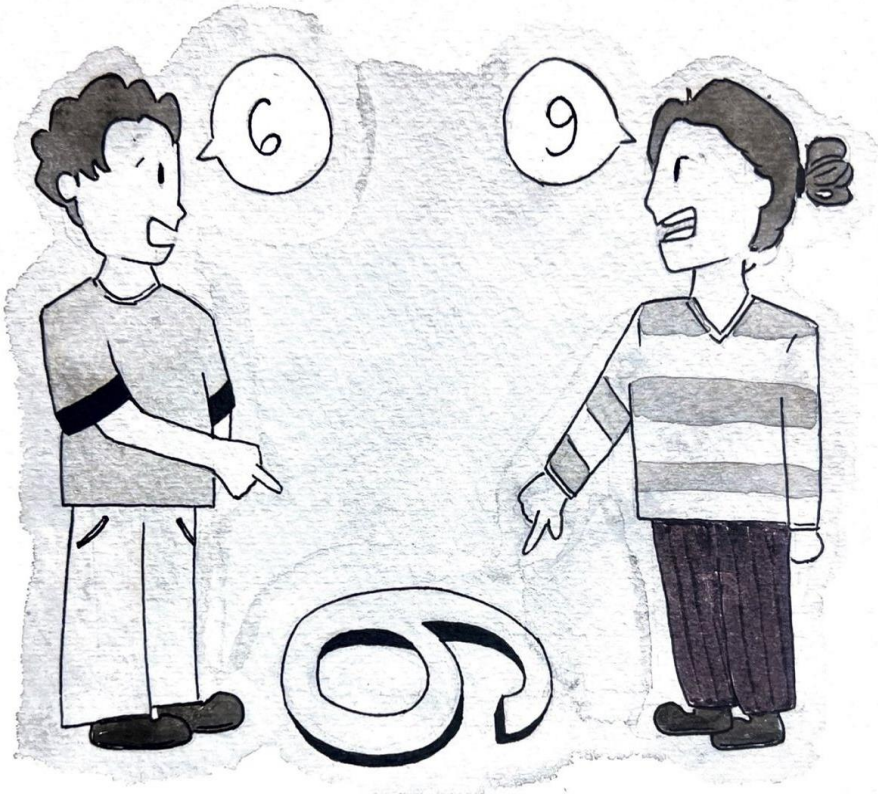
- Therefore, the psychoacoustical characterization (pitch, loudness, etc.) of tinnitus perception is unrelated to the level of autonomic activity or the severity of the tinnitus.

- People with relatively soft tinnitus sounds frequently report significant degrees of discomfort and anxiety, whereas those with extremely loud, complex, and persistent tinnitus report little aggravation or distress.

- if an individual's autonomic nervous system activity is elevated as a result of a previous deeply unfavorable and traumatic experience, tinnitus at this time further elevates the activity level of autonomic nervous system and leads to a vicious circle.

- Occurrence of tinnitus at a time of low autonomic nervous system activity leads to natural habituation.


Which one are you?
1/2 FULL?
1/2 EMPTY?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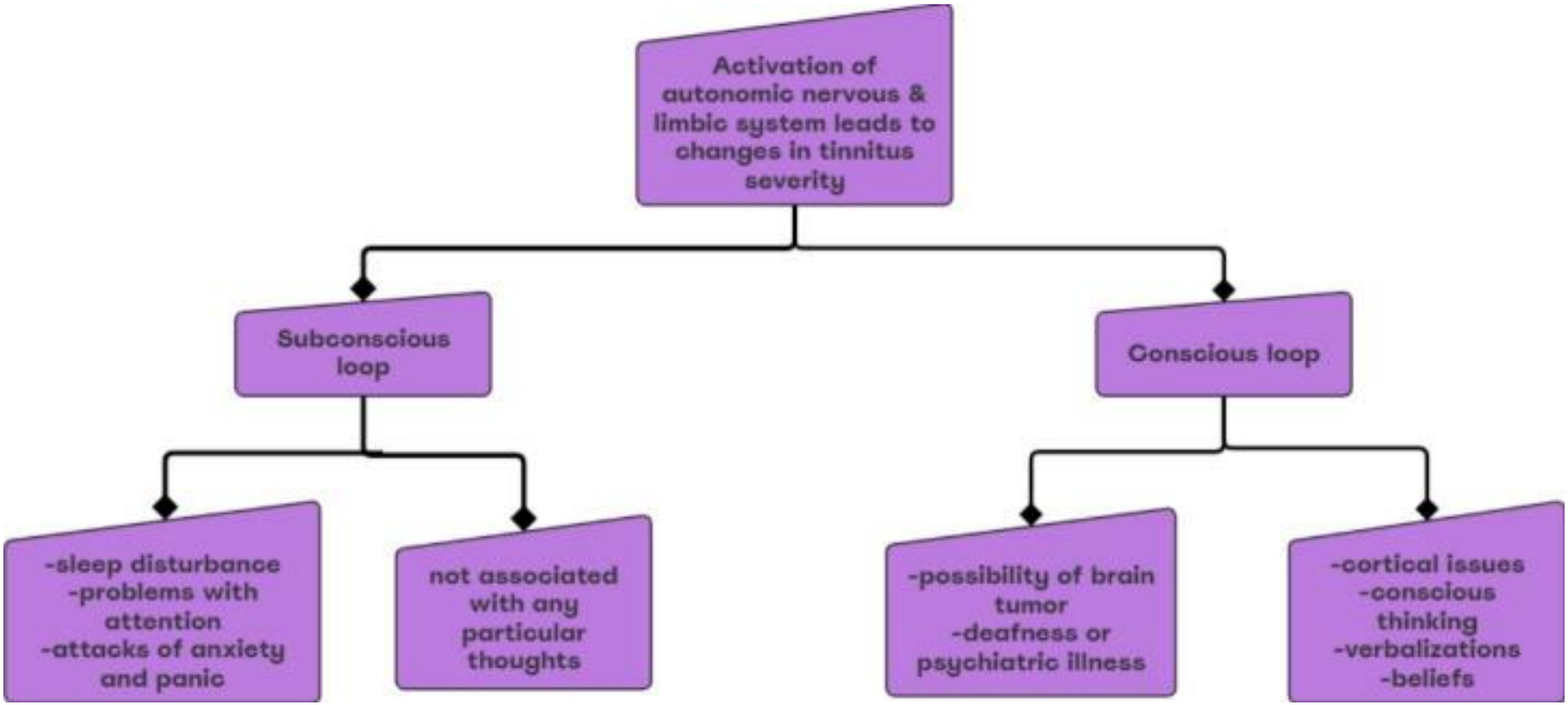
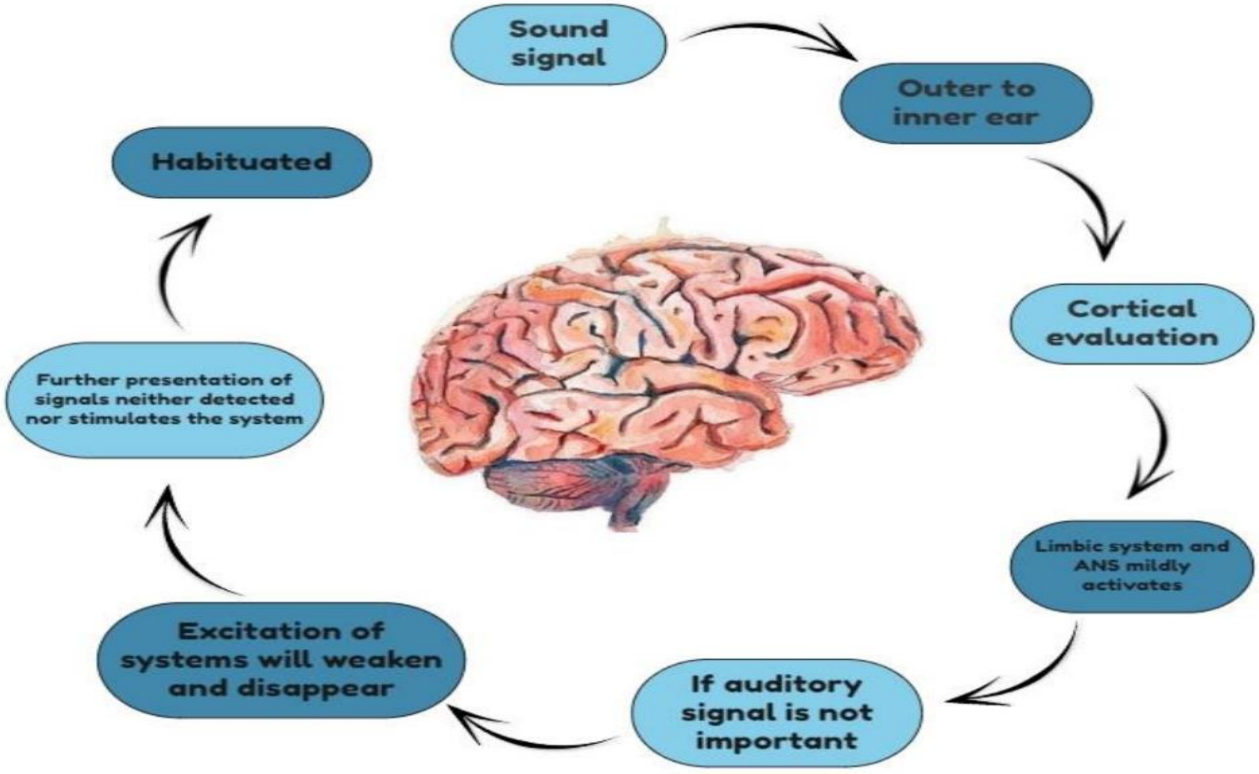
3. Am I really aware about my tinnitus!!??

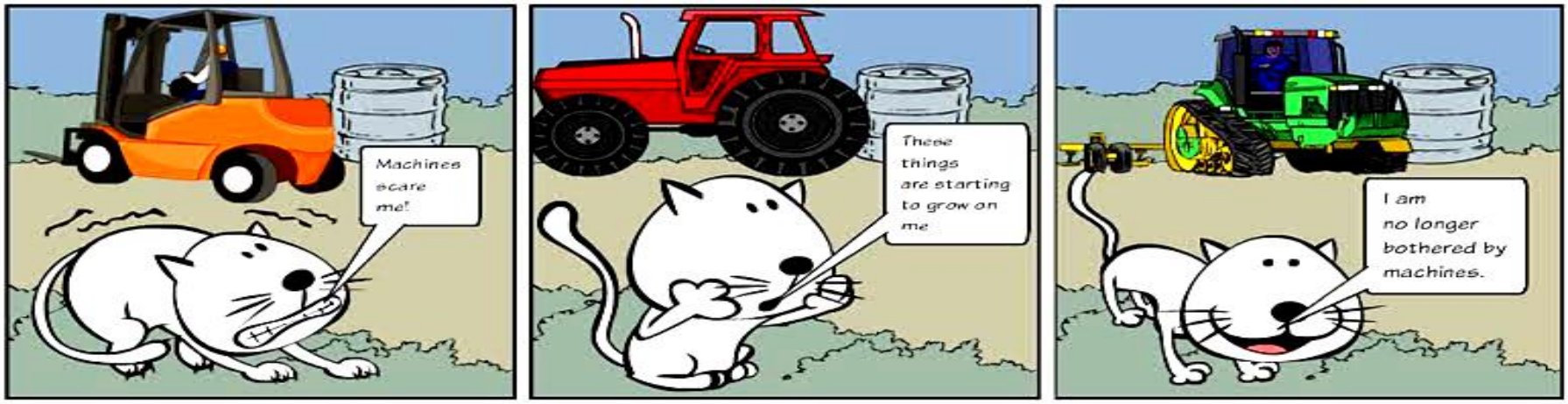
- Without the patient consciously thinking about it, a subconscious loop, or vicious circle, can steadily worsen tinnitus.
- Subconscious loop ⟶ autonomic nervous system activation ⟶ patient is unaware.
- Conscious loop ⟶ awareness of the presence ⟶ thinking about tinnitus.
- Patients display symptoms that indicate activity in both the conscious and subconscious loops, both of which contribute to the final reactions to differing degrees.
- Tinnitus evokes fears about its outcome in terms of sinister pathology, irreversible changes, it's inevitable worsening and the impossibility of successful treatment.


Activation of autonomic nervous & limbic system leads to changes in tinnitus severity
Subconscious loop
Conscious loop
-sleep disturbance
-problems with attention
-attacks of anxiety and panic
not associated with any particular thoughts
-possibility of brain tumor
-deafness or psychiatric illness
-cortical issues
-conscious thinking
-verbalizations
-beliefs

4. Really habituation possible!!!???
   - New sounds attract our attention but habituate easily if deemed to be unimportant or without emotional association.
   - It is possible to habituate both the reactions to tinnitus and the perception of tinnitus itself using appropriate techniques.
   - First experience of a new and previously unknown sound results in excitation of the auditory pathway up to the cortex.



Crows present in corn field Introduction of scarecrow Prolonged exposure to scarecrow



Reference: by Lukepierce14

Four stages of habituation –

Stage 1 –

- Tinnitus is persistently felt, except when sleeping, and it is masked by louder sounds.
- Tinnitus causes frequent anxiety and depression.
- It's difficult to focus for more than a few minutes.

Stage 2 –

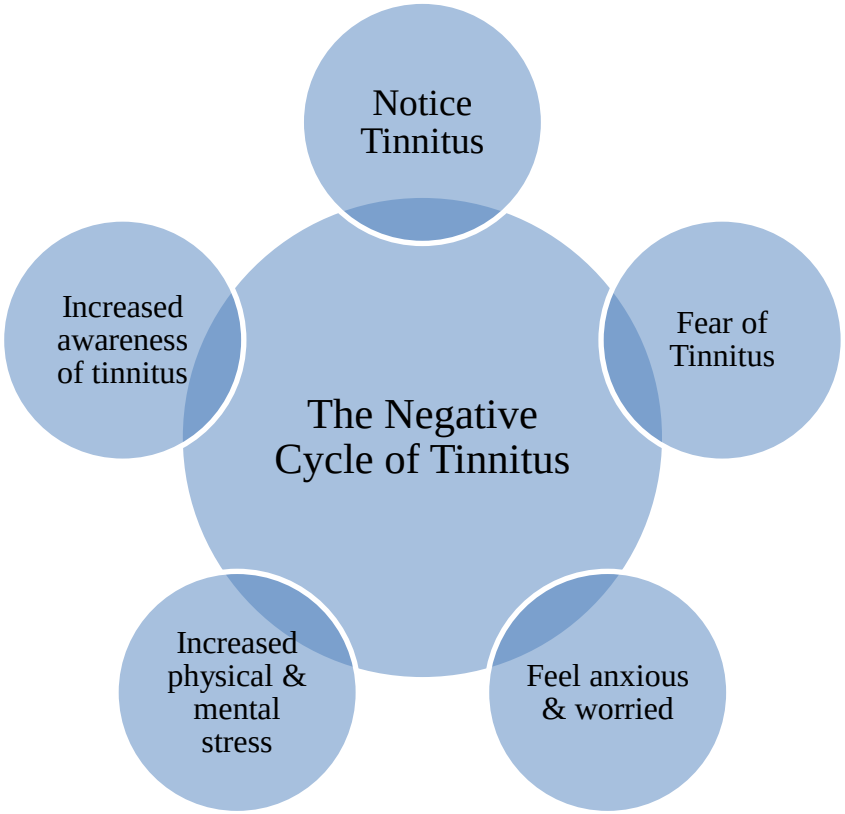
- Tinnitus awareness is intermittent, especially during absorbing tasks. Tinnitus can be turned off at times.
- Increased participation in usual activities reflected improved focus.
- Beginnings of emotional acceptance; the consequences of tinnitus no longer appear disastrous.

Stage 3 –

- Tinnitus is mostly noticeable during times of fatigue, tension, or silence.
- Noises are most noticeable when listening and mental concentration are required.
- Noises are more distracting than emotionally disturbing.

Stage 4 –

- Tinnitus receives little attention. Attention is limited to times when it is louder than usual or when you are reminded of it.
- Normal activities are not disrupted by noise.
- Tinnitus became neither pleasurable nor terrible as a result of emotional acceptance.


Notice Tinnitus
Fear of Tinnitus
Feel anxious & worried
Increased physical & mental stress
Increased awareness of tinnitus
The Negative Cycle of Tinnitus

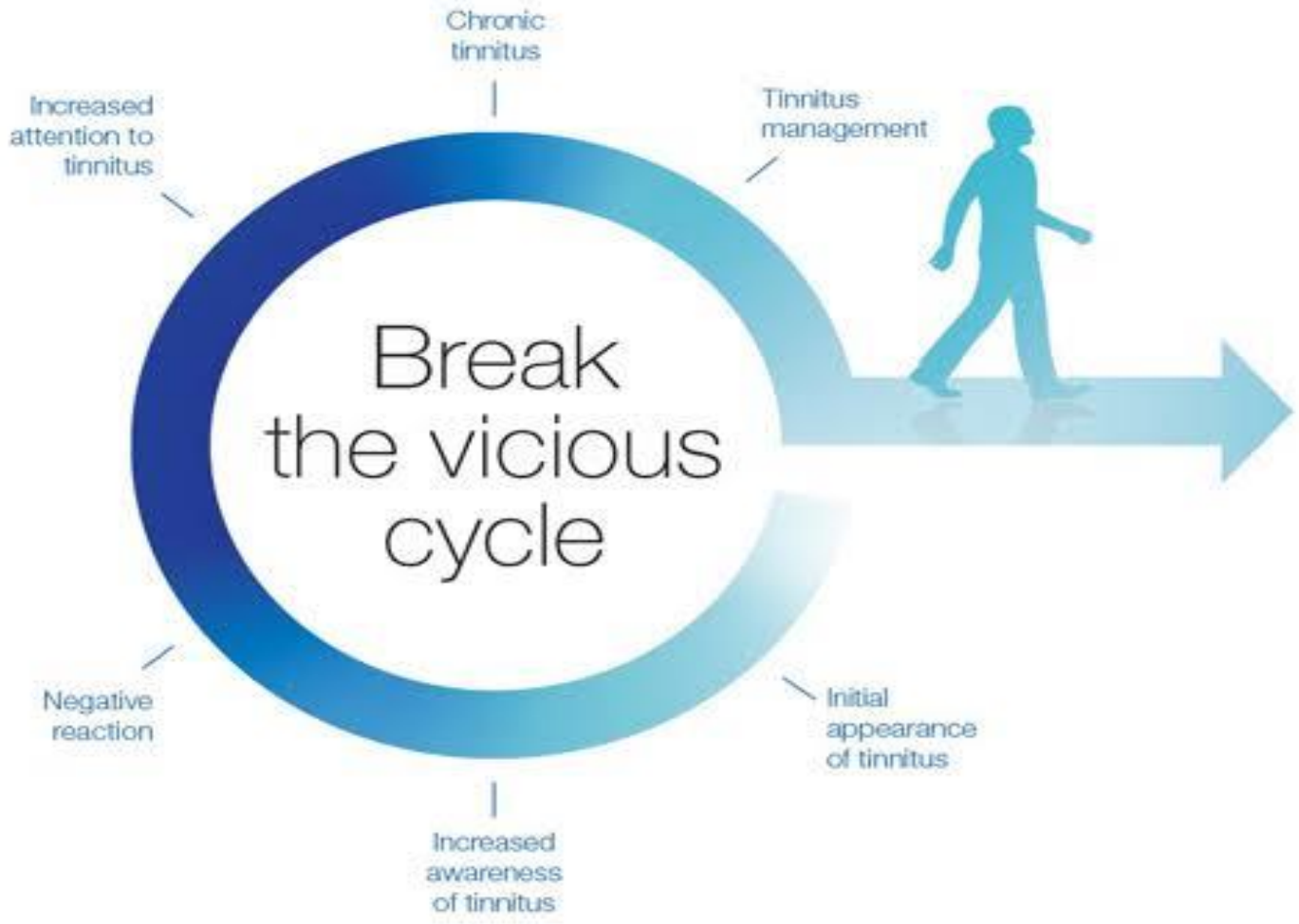
- British psychologist Richard Hallam suggests that habituation occurs with all types of tinnitus, regardless of volume, pattern or pitch. The stages of habituation, proposed by Hallam, describe the typical course of habituated behaviour they provide a vision of what to expect as well as a yardstick to measure progress.

- **Self-care –**
  Patients can improve their condition by using general wellness and relaxation techniques:

  - Increase relaxation –
    Patients frequently say that regular soothing activities, such as yoga, meditation, and music listening, make tinnitus less bothersome.

  - Sleep –
    Tinnitus frequently interferes with sleep, so devise a sleep strategy. To conceal the sound of tinnitus, use sound machines, radio static, or a fan. Caffeine, alcohol, and other drugs that may interfere with sleep should be avoided.

- Create a support network –
  - Patients who are effective in controlling their tinnitus typically have excellent support networks, which may include a spouse, family, or friends who have been educated about tinnitus. A tinnitus support group might give a platform for caring people dealing with similar issues.



Reference: Raleigh Hearing and tinnitus center

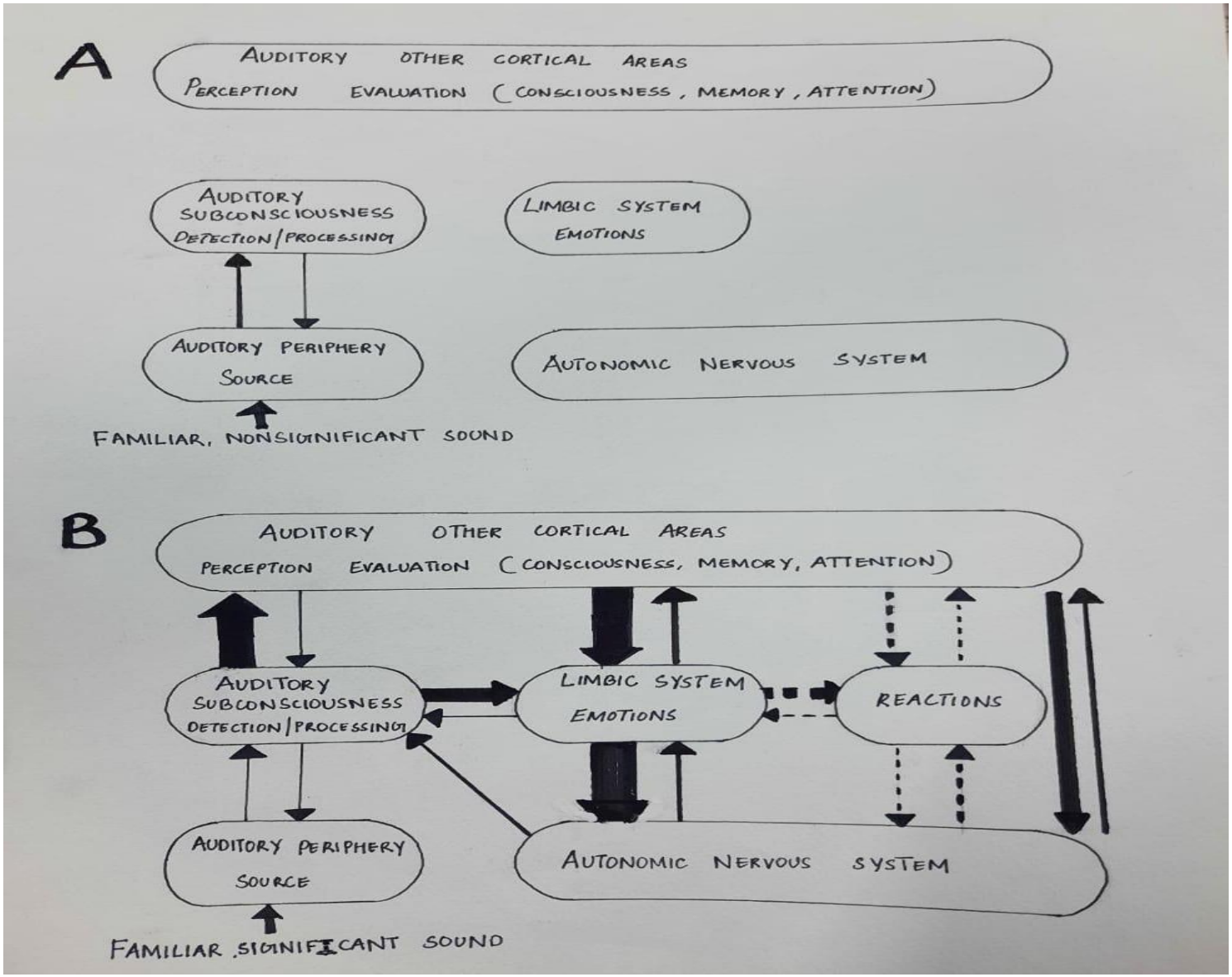
How to decrease the activation of autonomic nervous system related to tinnitus?????

- Reclassification of tinnitus –
  - The first stage is to cognitively categorize tinnitus as a neutral or semi-neutral input, as habituation cannot occur without this.

i. Patients are given information claiming that tinnitus is a result of benign compensation occurring within the auditory system.

  - Discordant dysfunction theory - Tinnitus is caused by one type of sensory cell, OHC, being more defective than the other type of sensory cell, IHC, at the same region of the basilar membrane in the cochlea.
  - Auditory gain - OHC's act as an amplifier within the cochlea.

- As a result of this reclassification, the higher cognitive loop's engagement of the limbic and autonomic nervous systems is eliminated or much reduced, leaving just the subconscious loop.
  A – These signals are not inducing reactions (habituation of reaction) & are not perceived (habituation of perception), does not activate limbic & ANS nor the higher cortical areas.
  B – High level of activation of the limbic & autonomic nervous system & higher-level cortical areas.


A
AUDITORY OTHER CORTICAL AREAS
PERCEPTION EVALUATION (CONSCIOUSNESS, MEMORY, ATTENTION)
AUDITORY SUBCONSCIOUSNESS DETECTION/PROCESSING
LIMBIC SYSTEM EMOTIONS
AUDITORY PERIPHERY SOURCE
AUTONOMIC NERVOUS SYSTEM
FAMILIAR, NONSIGNIFICANT SOUND
B
AUDITORY OTHER CORTICAL AREAS
PERCEPTION EVALUATION (CONSCIOUSNESS, MEMORY, ATTENTION)
AUDITORY SUBCONSCIOUSNESS DETECTION/PROCESSING
LIMBIC SYSTEM EMOTIONS
REACTIONS
AUDITORY PERIPHERY SOURCE
AUTONOMIC NERVOUS SYSTEM
FAMILIAR, SIGNIFICANT SOUND

ii. Unknown threats elicit a considerably weaker autonomic reaction than known dangers.

- Offer a detailed description of the mechanisms that cause tinnitus perception, as well as those that cause discomfort and unpleasant emotional responses.

- The patient is instructed on critical aspects of the neurophysiological model of tinnitus.

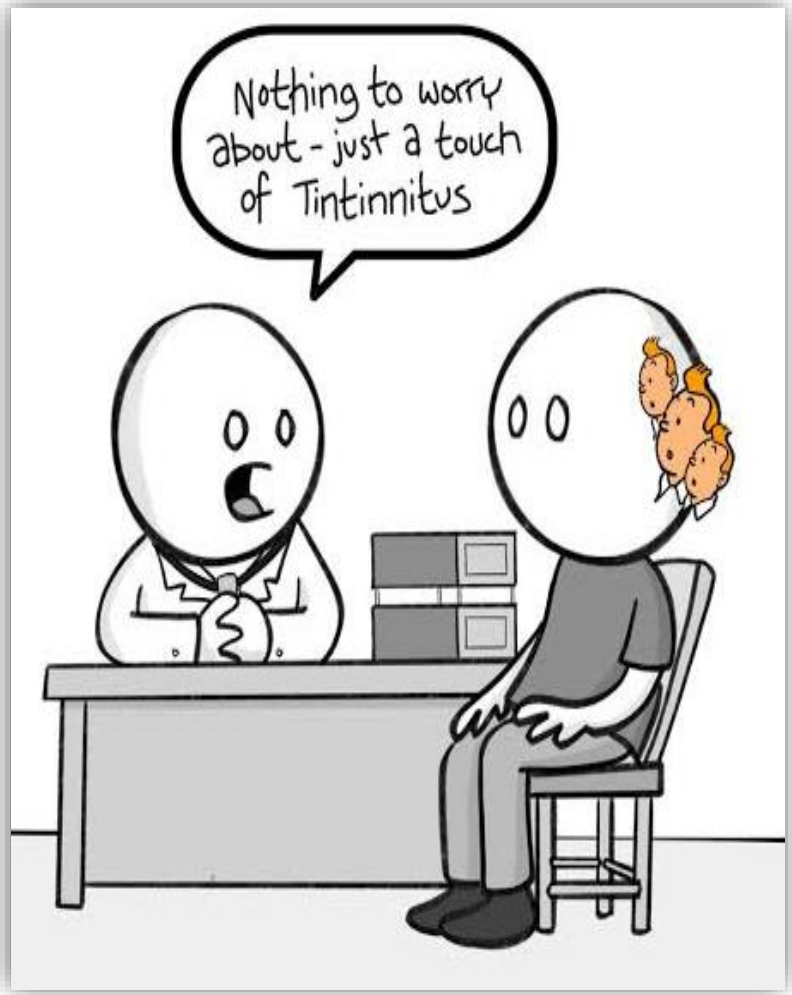
- This causes a decrease in autonomic nervous system activity because patients now understand what is happening and why.

iii. Establish new positive associations with tinnitus

- Patients are informed why tinnitus is not dangerous.

- Instilling optimism the likelihood of successful therapy, as well as actively involving the patient in this process, results in a significant change in emotional attitude and response.

- Different stress management treatments, biofeedback, relaxation training - occasionally hypnosis or simply effective time management - participating in other enjoyable activities may result in lower tension and annoyance levels.


Nothing to worry about - just a touch of Tintinnitus


Doctor, my ear keeps ringing...
Well, answer it then..!
WHITE

VIII.Sound Therapy

- Sound therapy, which reduces the strength of the signal, aids in habituation.

- When we boost the background neuronal activity in the auditory system by adding sound, the disparity between the tinnitus signal and the background neuronal activity reduces.

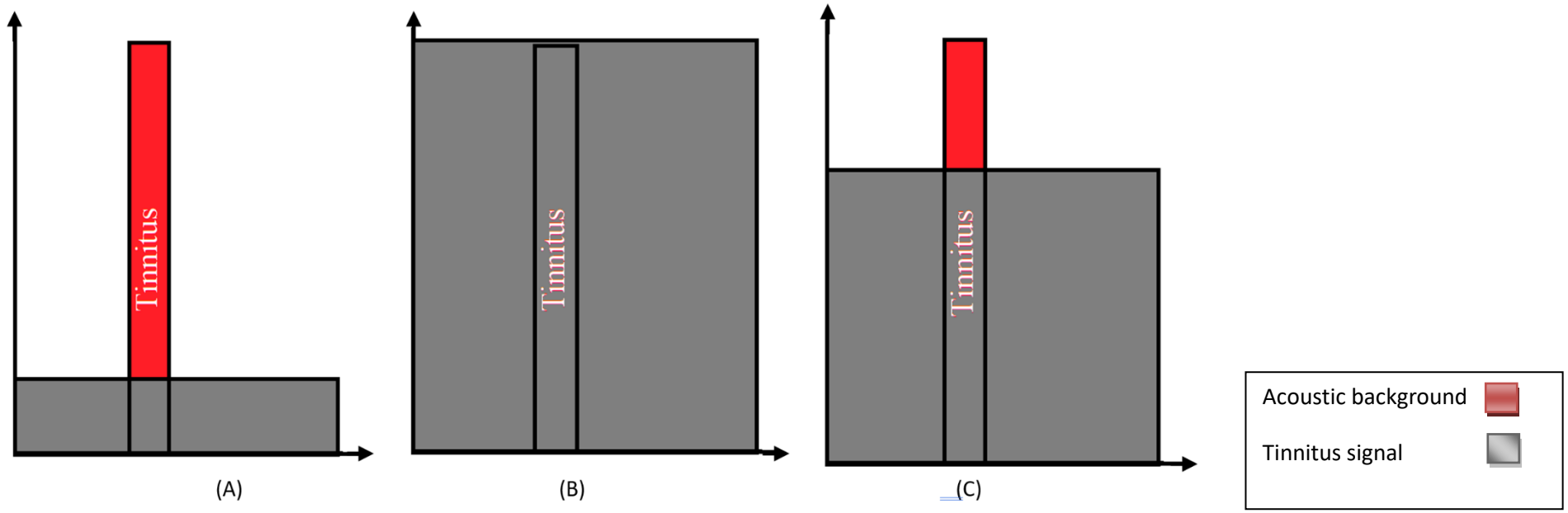
- Subcortical detection of tinnitus-related neural activity gets more difficult as contrast is reduced.

- In turn, increase the habituation of the tinnitus signal for both tinnitus – induced reactions and perception.

- The “Ten second exercise” –

    - Advises patients to focus on their tinnitus reaction (on occasion and for limited durations only) in order to record the strength of their physiological reactions to it and strive to lessen these negative responses through an act of will.

    - This process is aided by practicing relaxation exercises at the same time.



Tinnitus under different acoustic condition. (A) Tinnitus in quiet environment. (B) Tinnitus masked by high level of noise. (C) Tinnitus signal against the background of low-level noise.

IX. Medicines really work!!!??? … No

- There is no medicine that can be suggested for the treatment of tinnitus.
- These medications are intended to influence central nervous system function.
- There are several medicines that reduce limbic and autonomic nervous system activity and are routinely used in the treatment of anxiety.
- They also reduce the flexibility of the central nervous system, slowing the process of habituation (benzodiazepines).

How long does it take??

- The processes of habituation of both reaction to tinnitus and perception of tinnitus are very gradual and take time, usually measured in months, because it is vital to keep conditioned reflexes while we cannot completely remove reinforcement.

- Some individuals see subjectively substantial improvement within a month or two, while others see a benefit later in their treatment.

Tinnitus:
How Long Does it Take to Habituate

X. Summary

- Tinnitus is not a harmful condition, but rather the outcome of the auditory system's healthy compensation to some abnormalities in neuronal activity, which are typically created in the periphery.

- Tinnitus causes issues and behavioral symptoms due to the brain and body's reaction to the sound, not the perception of it.

- Tinnitus-induced reactions are caused by conditioned reflexes.

- Conditioning reflexes can be retrained, resulting in habituation of tinnitus-induced behaviors and perception.

- Tinnitus must be reclassified as a neutral/semi-neutral stimulation in order to be habituated.

- A decrease in the strength of the tinnitus signal, achieved by the right use of sound treatment, can aid with habituation.

- The primary goal is habituation of tinnitus-induced reflexes; once achieved, habituation of tinnitus perception will follow naturally.


"We can't stop the ringing in your ear, but we can modify it to your favorite ringtone"
AUDIOGRAM

Manual on counselling in the management of tinnitus

It is endorsed that those who experience tinnitus frequently experience anxiety and depression and find it impossible to ignore even the slightest variation in its behavior. This is because traditional beliefs about tinnitus often portray it as an incurable illness that can drastically reduce life quality. All of the negative reactions progressively go away once the truth about tinnitus, it's natural, benign, and essentially normal basis, is known and understood. The below examples help tinnitus patients to understand it better.

1. Reaction to a stimulus depends on the context.
2. Reaction to stimulus depends on its associations
3. The suppression of enjoyment of pleasant things by presence of stimuli representing negative events.
4. Effect of prolonged continuous activation of the autonomic nervous system.
5. Elevated autonomic nervous system activity impacting on sleep patterns.
6. Ability of the auditory system to detect and discriminate complex patterns.
7. Pattern recognition and organization.
8. Importance of meaning versus loudness of signal.
9. Gradual desensitization.
10. Common sense reactions are not necessarily correct.
11. Strength of sounds depends on context
12. Habituation: pattern matching
13. Small signals producing a big response (depends on meaning too).
14. New signals are always monitored.
15. Unpleasant emotional responses to harmless signals. Desensitization schemes.

16. Cultural elements strongly affect our reactions.

The details on these topics are provided in the following sections.

1. Reaction to a stimulus depends on the context.
   a) Every day while doing household work you listen to a man singing from your neighborhood and you enjoy that. After a few months the man dies in an accident. But you continue to hear the songs from the neighborhood. Later, on enquiry, you came to know that it's the brother of same person who is singing now. You won't be able to accept it and the song you used to enjoy before would turns out to be spooky.

   b) It is a Monday morning; you need to wake up early in the morning to go for work but you feel extremely sleepy and lazy. The sound of the rain outside and the car's loud horning noises puts you in a bitter mood. As you struggle and try to go dress up, you get a notification that due to heavy rain and road block, you can work from home that day. You instantly get into a happier mood and the sound of rain outside suddenly makes you feel happy and peaceful.

   c) It's the first day of your vacation, you wake up in the best mood as you have no worries and troubles to deal with. You decide to enjoy the morning by getting some fresh air out on the balcony with a cup of coffee. You hear the birds chirping and it puts you in a happier mood.

      But later that evening you get a call from your boss asking you to return to work immediately. This puts you in a bitter mood and suddenly the bird's

chirping outside irritates you and you feel like you need some silence, unlike what happened this morning.

d) On a late night after watching a movie from the horror genre, which factually elicited fear and disgust though for entertainment purpose, we might go to bed terror stricken.

   The dark subject and the transgressive topics or themes may already bother you. Subconsciously thus on a night like this the howling of a street dog might evoke fear, distress and panic in your mind.

   However, on a normal day in the noon time, if the same street dog happens to howl before you, you might not even notice or take it seriously. You would prefer to think of it as an attention-getter and may not even pay attention. Thus, we get to see response you provide depends on the contrast.

e) You usually eat food from street food shops during your lunch breaks as you live quite far from where you work.

   One early morning while watching the news, you hear about a case of food poisoning caused by a street food shop and that day you are a bit cautious to eat street food and decide to have food only after reaching home. Your reaction to a habituated action has changed with context.

f) You always take a shortcut route while going to school as it saves you about 6-10 minutes compared to the normal route. This road is narrow and has less people.

One day while going on your way, a nearby shopkeeper warns you about the snakes in roads like these and to be careful. But you were late to school and had to use that road. You were anxious and tense and every sound you heard made you alert and in panic. You were relieved to finally cross that road.

Similarly, depending on the situation, the sound of tinnitus might elicit a completely different response.

2. Reaction to stimulus depends on its associations.
    a) There is a "dum" sound from your bedroom and you are used to it, but one day if an exorcist visits your house and says that the sound has an unusual connection, then from the very next moment onwards you would start associating the sound to a terrifying event.

    b) Suppose you are hungry and you want to have something to eat hence you go to kitchen. As you enter the kitchen. Your mom is cooking something with the pressure cooker. You can hear the birds chirping from the window. This happens a couple of times. The next time you go to the kitchen, you start hearing the sound similar to that of the cooker whistle, even though it is not present there.

    c) A girl once goes to a restaurant and decided to order some biryani as the food arrives, she hears the commotion in the nearby tables that stones were being found in the food and this made her not to enjoy the

experience and she was focused on finding anything wrong with the food. Hence, missing a pleasant experience with the food.

Similarly, tinnitus, once it has acquired negative association, indicates a danger is periodically focusing our attention and focus on it against our will, distracting us from enjoying another worthwhile task.

d) You went to your friend's house to work together on a project. As you reached her house, you came to know she has a dog and you are terrified of dogs. You sat down with her to start with the project but you just can't stay focused and be attentive to your work. You find yourself observing the dog and its movement but your friend reassures you that the dog will cause no harm. You still stay alert throughout and couldn't give your full attention to your project.

Because of widespread conventional myths that tinnitus is an incurable ailment that may wreak havoc on one's quality of life, it's understandable that many who experience it get nervous and depressed, and find it hard not to track every slightest change in its behavior. All of the negative emotions go away once the truth about tinnitus, it’s natural, benign, and essentially normal basis, is recognized and acknowledged. Gradually all the negative thoughts can be converted to a positive outcome.

3. The suppression of enjoyment of pleasant things by presence of stimuli representing negative events.

   a) Imagine it's the last day of your exams, everyone is very excited about the end of the semester, but your fear of exam results and not being able to achieve up to your expectations doesn't allow you to feel the same. Later that week, while you are in great anxiety about your results, a close friend of yours invites you to join him for a trip to your favorite amusement park. At first, you are excited about this trip, but on second thought the anxiety of your upcoming exam result is not allowing you to agree to this trip, even though you are aware this is a good opportunity for you to enjoy and have fun after a stressful period.

   b) Let’s imagine the case of an old women who is a pianist who had been playing keyboard since the past 30 years of her life and each new day with the same zeal and zest that nothing can suppress.

      However recently she met with an accident which created turbulence in her life. She injured her leg and the doctors informed that it had to be amputated shortly.

      Now while playing her keyboard, she feels music is less important for her and her mind now is preoccupied with the upcoming negative event of getting her right leg amputated.

   c) Imagine you are an excellent cricket player and love to practice cricket daily to improve your skills. But since your entrance exam for your

dream college is happening in a month you are not able to attend the practice sessions. Here, the fear of not getting the seat stops you from attend the sessions which gives you the utmost pleasure. This effect is reflected in everything you do later till the exams are over.

d) You are down with viral fever for about 3-4 days and you suddenly get a chance for a free trip to Maldives- your dream destination. As much as you want to go, you are unable to because your doctor advised you to rest for a week and half. You missed out on a great trip due to your health conditions.

   Similarly, the presence of tinnitus, which causes dread and has strong negative connotations, suppresses the pleasure of regular life and life quality, and has a huge influence on life quality through this mechanism.

4. Effect of prolonged continuous activation of the autonomic nervous system.

   a) Imagine that you are a child waiting for your school bus one early morning. Your mother is not able to accompany you like every other morning, so you have to hold your water bottle all by yourself. Your bus became unusually late that day and you gradually started to find it harder and harder to hold the water bottle.

   b) Every day after work you go back home by local bus. Mostly you won't get a seat and will have to hold on the roof grab handles of the

bus. Your stop will reach within ten minutes of travel. But imagine on a day where there are some traffic issues and the bus takes way more time than it usually does to reach the stop and you have to hold on the handle for too long in that crowd after a tiring day of work. This will make you exhausted.

c) The temple festival is near and you along with your friends went to see the fireworks. This time, the number of crackers that are being burst is huge. You reach the spot and then you enjoyed the fireworks. Later you reach back home and you find out that you experience tinnitus after exposure to loud noise, even though there is no apparent sound coming from anywhere.

d) A girl is starting a new job, she got ready and told her mother that she would come home by 8 pm. Her mother was worried since it was her first day. But her daughter reassured her that she can handle it and left for work. It is 8 pm but the girl still hasn't reached home, the mother gets worried and makes several calls but her phone is switched off. The mother started to get more worried as time went by. It is 9 pm now but her daughter hasn't reached home. The mother started to panic and started to get very anxious and felt dizzy with tension. As she was going to call the police, the doorbell rang and it was her daughter and she felt relieved. The girl became late as she was caught in a traffic jam. She was not able to contact her mother as her phone battery was down. Here we can see the mother's increasing stress and anxiety as

her daughter got late. As time went by, the mother's autonomous reaction also increased.

e) You have an interview in an hour. You have been preparing for this interview for a month or so and is confident enough to do well.

You reached the place on time and they called you in after a while.

At first, you answered the questions confidently and felt you were doing well. But the interview kept going even after 25 minutes.

After half an hour, you gradually started to lose your confidence and started to get nervous and was unsure about your responses. You started to get anxious and was in a mode of panic about your performance when the interview was prolonged than your expectations.

Tinnitus, which causes even moderately raised levels of activity in the autonomic nervous system, can cause extreme weariness if it is persistent for lengthy periods of time.

5. Elevated autonomic nervous system activity impacting on sleep patterns.

a) It is the night before your college excursion. You have to wake up early so you ask your parents to wake you up without fail as you are anxious you may not wake up on time. You packed everything and set the alarm but you cannot fall asleep due to the excitement about the trip. You finally fall asleep but you ended up waking up early, way

before your alarm. Your sleep before the day of your excursion is affected because of your thoughts and excitement about the trip.

b) Your old ceiling fan finally gave up on you, after 10 long years. Not being able to sleep in the hot room anymore, you decide to buy a brand-new fan. You are excited to sleep that night, but you just can't fall asleep!!! You realize that you are habituated to the creaky sound of your old fan.

c) You are attending a one-month military camp as a part of your NCC unit from your college. You have to wake up every day by around 4:30 in the morning to attend the physical training. If you arrive late for the training, you'll be given severe punishments for the whole day. This makes you feel so anxious that you might reach late and hence you lose track of your sound sleep pattern which you had back at home.

d) Your school announced that your board exam results would be declared the next day. Your parents and family all are very excited to know your results. You set your alarm to wake up early and check the results but you are not able to fall asleep. Your heart keeps beating loud and fast, you are so nervous that you just can't fall asleep. The thought of your upcoming exam result is affecting your sleep pattern.

Tinnitus, which causes even slight stimulation of the autonomic nervous system and may have a significant impact on your sleep habits.

6. Ability of the auditory system to detect and discriminate complex patterns.
   a) You are selected as the magazine writer for the latest edition of your college magazine and your topic is "experiences of the alumni". As a part of this you have interviewed more than ten of the passed-out students in a very detailed manner. Later, you get to know that only five articles can be selected. This makes you sit and analyses each interview and select the best ones from the whole.

   b) You are a police officer and you are assigned a murder case of a political leader. You are under so much pressure and is obliged to answer so many questions about the murder in a short span of time and you have no clue about the murderer initially. As you start investigating the case, you collect small but significant hints about the murderer. Gradually, you have collected almost all evidences which will lead you to the murderer.

   c) When we are in a classroom there can be various other distractive noises like the fan, chairs moving etc. But to focus on what's being taught our auditory system chooses to ignore the unwanted noises and listen to the teacher's voice more.

d) You are making biryani for your family. Your search for all the necessary ingredients and buy the missing ones. Now you have to assemble the vegetables, spices, and rice to make the perfect biryani.

e) The police office in charge of a murder case, starts his investigation. He collects the evidences one by one by observing the crime scene, collect samples from the crime scenes and send the samples to forensic team for further investigation. Then he proceeds to next step which is questioning and speaking to the people related to the case and getting more details to his investigation. Here we can see an order or pattern in the steps of investigation. The police officer gathers all details in a particular order and organizes everything gradually to get major clues to the case.

Similarly, patterns of neural activity detected in the auditory system are gathered together, resulting in a final experience made up of many distinct discrete components originating from various parts of our environment. These components are put together in the subconscious mind.

7. Pattern recognition and organization.
   a) Imagine the sound signal which we receive from an external source is like a shuffled deck of cards.

As the signal passes from the lower structure to the higher structures of the auditory system, the sounds are extracted and arranged like how we arrange the deck of cards according to the symbols.

b) You are at a gathering in your office. You were talking with your colleague and spotted people from Taiwan speaking in Taiwanese. You are able to understand they are speaking about work related matter through their manner and way of speaking but you cannot actually understand the meaning of what they are speaking.

As the brain reaches the cortical perceptual regions, similar key parts of the sound environment stored in this neural patterning are identified and retrieved in a steadily more complicated manner. Our final sense is made up of a variety of discrete, full, and yet complicated audio events that we can exactly situate in our surroundings.

As the auditory system converts sound patterns into neuronal activity patterns, the cochlear nuclear complex in the brain stem, which is the start of the central auditory system, is reached. Significant patterns are extracted from the initial information during the ascending auditory pathways, with the remaining unwanted information rejected, and it is finally translated (e.g., perception and evaluation) into a form that we can consciously perceive, understand, and verbalize at a cortical level.

8. Importance of meaning versus loudness of signal.

   a) You are driving on the way to your home after a long day of hectic work. You are running back to the comfort of your home, but you hear a faint noise gradually becoming louder and louder. Suddenly a blaring loud noise of a speeding ambulance gives you a sudden panic because it reminds you of an earlier incidence where you took your friend in the ambulance to the hospital. which causes you to shut your eyes and close your ears. As the ambulance drives away you gain your stability back, but the noise keeps recurring in your head, causing you to lose your concentration while driving, which forces you to stop the car and have a moment to yourself to avoid any possible accident. This reminds you of an earlier incident where you took your aunt in the ambulance to the hospital.

   b) You are going to pick up your daughter from school and as you reach the school area you get stuck in heavy traffic and there are a lot of traffic noises and loud horns blaring. You are unable to spot your daughter in the car block and suddenly you hear a faintly familiar sound. You hear your daughter calling for you from the crowd of parents and school kids since it’s a familiar sound for you. You can detect the familiar sound even though you were in a very loud environment

      Similarly, we've all heard our first name spoken in a close conversation at a party or a loud meeting. We are unable to avoid being distracted

by this short utterance which has no effect on our nearby neighbors who have different names. The frequent repeating of our initial name during infancy and childhood causes powerful programming of neural networks and central auditory pathways, resulting in a rapid, unconscious, and instinctive response to this speech.

9. Gradual desensitization.
    a) Your child is hypersensitive because of which he shows extreme sensitive reactions towards many things. A friend of yours then advices you to visit an occupational therapist for the same. The therapist counselled you about the condition and suggested the methods to desensitize the child. The method was to always start by stroking on his fist and making him aware and comfortable about the touch and only then gradually the face has to be touched upon.

    b) A man has been a vegetarian for the past 30 years. He went for a health check-up and after a series of health tests done, the doctor said he has severe multiple deficiencies and he needs to introduce a protein- rich diet and preferably to start including eggs in his diet. The man decided to start Including eggs in his diet by starting with eggs but he is very sensitive to the smell and taste of eggs. He is suggested to slowly start having little portions at first. He tries to cook it in a way that could enhance the smell and found some ways to desensitize the taste and smell. After two months or so, the man was able to enjoy eggs when cook in certain varieties.

The central auditory system is gradually desensitized by providing patients with a steady increase in sound through noise generators.

10. Common sense reactions are not necessarily correct.

a) A person who leads a very unhealthy lifestyle decides to join a gym as he becomes more conscious of his health after he attended a workshop on "Lifestyle Disorders". He finds time in his busy schedule to go to gym every day. One day, while he was doing cardio exercises his thighs got injured and it turned numb for a while. This incident made him reluctant to attend gym for the next few days.

b) A person bought his dream bike with his own savings after so many years. He was so excited to ride the bike but was not that confident in riding bike in a crowded city as he recently learnt how to drive. He decided to take a short ride in his city after much resolution. But unfortunately, he met with an accident which injured him. The incident instilled a fear in him which made him worried about riding his bike in the future.

c) A person wanted to consult a doctor for his laser surgery from a well renowned hospital in his city. He got so many good opinions about the same hospital. But, after a few days he got to know that one of his relatives were admitted in the hospital for a surgery and when enquired he got to know that the treatment was not well structured and the

hospitality was so poor. Due to this reason, he was reluctant to do his treatment from that hospital.

d) One day after a long day of work a man comes home, he complains it was a very sunny day and it was really hot outside. The man was very tired and thirsty and so he asked his son to turn the fan on. But after turning on the fan, he felt even thirstier, this is because even though it is common sense to turn the fan on when feeling hot, the fan actually dehydrates us by evaporating the moisture from our body. Here a common sense is necessarily may not always be right for us.

11. Strength of perception depends on contrast.

a) A mother is at her son’s school annual day function, where he is a part of two groups songs. She is waiting eagerly to listen to her son's voice and judge how well he performs. The first group he was part of an all-boys team and his mother found it difficult to distinguish her sons voice from the rest which were similarly pitched and as deep as his voice. But in the other group song, he was the only boy in a group of girls. When they started performing, the mother could easily spot her son's low pitched, rough voice as it stood out in contrast from the girl's softer high-pitched voices. The boy's voice could be perceived better the second time as its contrast with the others defined it better.

b) You are a motor maniac and one day you spotted one of your favourite cars- a Ford Mustang on the road. But suddenly a lane of cars coming

the same way with the car you spotted and you can't recognize the Ford Mustang and get confused for a while!!

Your father had a maruthi car which he sold off years back. You had so much affection for that car. One day while walking back from your college you spot a similar old car in the road. You had this big wide smile in your face when suddenly a huge group of similar old cars came the same way as a part of the "vintage car rally" happening in the town. You weren't able to spot the car again in that big pool of cars.

c) Suppose you are with your friend in a car and your friend has stepped out to buy a few things from the store and leaves you alone in the car for 1 to 2 hours. As you wait for your friend with the engine off, you start to notice a persistent ringing in your ear despite the fact that there is no sound around you. The ringing sound appears to have stopped when you open the car window.

d) One day you and your family went out for bird watching, a favorite family activity. You spotted a favorite bird of yours a rose-ringed parakeet. You excitedly keep looking at it and try to take a picture of it but after a flock of other birds passed the direction of the parakeet and suddenly you were unable to spot the parakeet among the large flock of birds.

12. Habituation: Pattern matching.

a) Your sister's family visited you and stayed with you for a weekend. Your sister has a two-year-old toddler, her cries and sounds kept the house lively. When they left after the weekend, the absence of your niece and her cries and laughter made you feel disturbed and felt longing for that toddler.

   You shift to your cousin's home for a few months as a part of your internship in that town. Your cousin has a toddler who is very naughty and cries over for all little things. You become so used to the child's cry over the period you stayed there. You leave that house after a few months and now you don’t get to hear that child's cry which makes you feel so much disturbed.

b) A friend has invited you to his house for a sleepover to make him happy. You agreed to go along to his place and spend a night. As you finish the dinner and go to bed, you have trouble falling asleep because you hear no sound, whereas at your own house while you went to bed, the heater kept making a kind of sound that has put you to sleep. But at the new environment there is no sound put you to sleep.

c) A man works in a sawmill for over 20 years, for the weekend he takes rest and finds comfort in his house, but can't help feel weird at times because he is not exposed to loud sounds during those days.

Due to the nature of his work, he is habituated to the loud sounds and doesn't feel quite normal without the loud sounds produced in the sawmill.

As a part of your article on "work environment of factory workers" you get to talk with some factory workers. These workers are so much exposed to loud sounds on a daily basis and are so used to it. All of them were asked whether they are aware about the serious ill effects of loud sound exposure. For this, a man replied that they are aware about the consequences but they feel so weird on weekends when they don't get to hear such loud sounds.

d) A man goes to a local tea stall during his break-time every day. This tea stall is located near a school so every time this man comes here, he is able to hear the school bell and the school kids running.

Once he went to the tea stall, during the school vacation time but he has an entirely different experience that morning without the sound of the school bell and school kids as he was habituated to those sounds for a long while.

13. Small signals producing a big response (depends on meaning too).

a) You and your friend have shifted to a PG for your studies. During night while both of them are sleeping suddenly hears some weird noise of falling utensils from kitchen side and both of them got up, you are so frightened hearing the noise but your friend said it might be some rats

and we will put rat traps tomorrow, but you are so scared that you can’t sleep without checking the kitchen area.

b) You and your friend go for a trip and one of the main attractions there is a popular hanging bridge. The view below the hanging bridge was beautiful and you wanted to cross that bridge. So, you asked your friend to go with you.

Once you both started crossing the bridge, your friend got scared of every little movement made by the bridge. You didn't seem to mind the shaking as you were enjoying the view and you liked adventurous activities like this.

Your friend asked you to walk slowly and not make any small movements and started to get scared at the movement and the sounds made by the bridge because of the people walking on it. A small movement here is producing a big response in the friend and it isn't a worry for you.

14. New signals are always monitored.

a) A worker newly appointed to work in a factory, on her first day of work, finds it extremely difficult to be in that space of constant loud noises. She is asked to write reports on the work there, but she is upset as she fails to concentrate on it, in that ambience of disturbance, while all her co-workers seem to be fine. She requests her official head for a change in her duty and she is allowed a change in work site which would be in effect only from the next month. She decides to somehow

manage to work in the factory for the remaining three weeks of the month, before she shifts. However, by the end of the month she doesn't anymore feel the need to move from the factory. She realizes that the sounds from the machines are more tolerable and that now she is comfortable working there. It wasn't in fact that the noises were lowered but, contrary to her belief, that her auditory system was accustomed to and stopped monitoring, the new sound. Habitual perception was functioning in this case.

b) It is the first week in your new home and you have been gifted a brand-new air conditioner by your best friend. You installed it that night and were enjoying the cool air at first but later on, you were not able to fall asleep due to the noises that the air conditioner made. You were not used to the noises made by the air conditioner and needed some time to get adjusted to it.

c) It is the start of monsoon season, after days of hot summer, it is suddenly raining heavily non-stop for the past two days.

   At first, you had a hard time concentrating on your studies and sleep due to the constant pelting sounds of the rain on your window.

   But after a week or so, the rainfall did not seem to bother you or your activities as you gradually became habituated to the sounds.

   It felt like a normal day and the rainfall was not an inconvenience anymore as your auditory system became adjusted to the new sounds.

15. Unpleasant emotional responses to harmless signals. Desensitization schemes.

a) Many people are scared of heights (Acrophobia) that these people easily get sweaty, tense and palpitation when exposed to even small heights, while people like this will have difficulty in going for trekking, climbing trees, standing on the roof of buildings, walking on bridges etc.

If you want to overcome this the strategy is gradually to get more exposed to heights like climbing small ladders, standing on a table and gradually increase the height by climbing trees and as time passes you will get familiar with heights and you can easily get rid of this phobia.

b) There is a boy, who although have learnt driving, fears to drive in a crowded place or when he is alone. People like him can overcome their fear only if they are exposed to such situations more often. And he finally decided to expose himself to the fear he was facing. He prepared himself to drive in the middle of a crowded place in the city. He drove the way he wanted but the worst he was scared about happened. He hit the car while taking a U turn. As a beginner it is really difficult to take the turns, but he handled the situation as calm as he can. Once he faced his fear, his courage got a boost. After the incident, he became more comfortable and braver to drive in such crowded place. This is the only way to become successful in overcoming one's fear, to expose oneself or to face the fear.

c) You are terrified of wall lizards, a very common creature seen in almost every house. But being a herpetophobia person (fear of reptiles) you get anxious and tensed just by finding one in your bedroom. You cannot even sleep peacefully after spotting one, even though you are aware that it is completely harmless and it does you good by protecting your house from unwanted bugs.

   You have been advised that to overcome your fear the strategy is to get reassured about their harmless nature and work hard on reducing your feelings of dislike, and get closer to wall lizards.

d) A man has an unexplainable fear of the police, even though he has not done anything wrong, he can't help but feel afraid when he sees police or a police car coming his way.

   One day while walking on the street, a police car stops beside him, this makes him extremely nervous and he started to have intense breathing and heart rate rising. The police just wanted to know the direction to another person's house and he felt relieved when they drove away.

   The person here is having negative reactions to such a harmless situation.

   It is beneficial to use sound reinforcement to minimize the contrast of tinnitus, however habituation will not develop if the tinnitus is "masked" (suppressed by other sounds) or drastically changed by noise generators.

16. Cultural elements strongly affect our reactions.

a) People who believe in supernatural things are more prompt to become a victim of tinnitus. Even though they would like to believe the contrary, this occurs to people. This might be just a feeling they have or a state of mind where they likely to believe in such things. If people have such thoughts going in their mind, they will see every natural and usual thing in such unusual way. We can say for instance, a family shifts to a house which is built years back where some unnatural deaths have occurred, they will hear a lot of stories from the neighborhood. And after hearing such stories the family will tend to hear similar things as mentioned above. Even though the house is completely fine at least a member of family will face tinnitus. This can also be happened in a good way. When people believe in positive energy, which we address as God, they believe in a supreme power, who is there for us, who is there to save us, to give will power to us. So, praying to God and things getting better for people will make them actually believe in such energy being present. Some people pray in each and every small thing they face. In such case they just do the best they can and will believe this was only because of their prayers. Even if it is right or wrong, this will benefit people and hence it makes tinnitus a good thing rather than a bad thing. Tinnitus can be good and bad as we see it.

b) There is a widespread belief in some rural areas of India that hearing sounds in your head or ears means the gods are communicating to you

and you are blessed. Because of this and a high level of tolerance, makes tinnitus a good thing rather than a bad thing. Tinnitus is once more regarded as a concern in cities and among those exposed to "western culture."

Once tinnitus has gained negative associations suggesting danger, willfully draws our attention to it, diverting us from other important responsibilities. Tinnitus that causes even slightly increased levels of activity in the autonomic nervous system (ANS) can cause severe fatigue if present for a longer period of time.

It is critical to educate both the general public and the specialists involved in medical and audiological care. It is critical to recognize that tinnitus perception is only weakly connected to tinnitus-induced distress.

Simply having tinnitus does not necessitate these negative emotions; in fact, the great majority do not. Proper information from credible sources should be widely accessible, especially for people who have recently discovered tinnitus and are understandably concerned about its meaning.

CHAPTER 5

EPILOGUE

Manual on counselling for individuals with subjective tinnitus was developed. The manual includes various sub-sections and levels under each domain that are relevant in counselling for people with subjective tinnitus. The structure of the manual is quite systematic and concise. The overall goal of this manual was to educate the individual with tinnitus about his or her tinnitus condition, to begin tinnitus habituation, and, finally, to neutralize the participant's negative emotional associations with his/her tinnitus, there is a necessity of providing guidance and awareness regarding the counseling for both clinical population and budding clinicians as well. This manual will aid clinicians in better understanding the cause and impact of tinnitus, allowing them to successfully counsel a person suffering from tinnitus**.**

Clinical Implications

- This research will help clinicians to gain better knowledge of the management of tinnitus or, at the very least, reduce its impact.
- This manual will be helpful in guiding for the practitioners and students as well.
- This manual can be used as a reference for an effective counseling tool.

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APPENDIX 1

TINNITUS MANAGEMENT - INTERVIEW FORM

Case Name: Case Number:

Place: Date:

DOB: Time:

Mobile number: Clinician:

I. General case history –

a) Ear pain

None ☐ R ☐ L ☐

b) Ear Discharge

None ☐ R ☐ L ☐

c) Balance problem (YES/NO, If YES describe)

d) ENT evaluation (Medications/Recommendations)

e) Hyperacusis/Misophonia (YES/NO)

f) Any relevant medical history?

g) Do you have history of exposure to loud noise? (e.g., working with heavy machinery, gunfire and explosions, music industry, etc.)

h) How would you describe your mood today?

i) Did your parent(s) have/ever had depression or mental illness?

j) Did anyone in your family have tinnitus, sensitivity to noise, or hearing impairment?

k) Details of any stress producing events that might have contributed or predisposed you to your main compliant? (e.g., traumatic events, life stress,

changes in job, school, life circumstances, accidents, hospitalization, severe illness and death in the family/friends, etc.)

l) History of mental health (If any)?

II. Tinnitus –

a) Onset of tinnitus (Gradual/Sudden)?

b) How frequent do you experience tinnitus?

c) Does external sound have any effect on tinnitus (None/Louder/Softer)?

d) How long does your tinnitus last (min/hours/days)?

e) When did it start and any known reason that might have caused it?

f) What does tinnitus sound like?

g) Where do you hear it?

h) Intermittent/Constant:

i) Fluctuations in volume (YES/NO):

j) Any other tinnitus specific treatments?

k) Activities that prevented or affected (concentration/ quiet resting activities (reading, relaxing, etc.)/sleep/work/restaurants/sports/social/others)?

l) Do you find that the tinnitus reduces/ increases when you are in quiet?

m) Loudness matching:

n) Pitch matching:

o) Residual inhibition:

p) THI score:

q) TFI score:

r) Why is tinnitus a problem?

s) Any other comments?

III. Hearing loss –

a) What is the degree of hearing loss and type of hearing loss (if any)?

b) Have you been recommended hearing aids (YES/NO)?

IV. Audiologist to complete –

a) Indicate main problems discussed during initial interview:

b) Recommendation:

c) Next visit:

APPENDIX 2

TINNITUS MANAGEMENT- FOLLOW-UP INTERVIEW

Name: Case Number:

Date:

The first series of questions are specific to your tinnitus. Please think only about your tinnitus when you answer these questions.

1. Is your tinnitus more bothersome on certain days than others? (YES/NO)

- If YES, how frequent do you have these “bad days”? Days per week/month?

- If YES, are they as common as they were before you began treatment?

- If YES, is it still as bad as they were before you began treatment?

2. Does any sound have an effect on your tinnitus? Is the sound making your tinnitus louder or milder, or does it have no effect?

- If “LOUDER” or “SOFTER”, what type of a sound has an effect on your tinnitus?

- How long will this last?

- Is it still louder after you've slept till at least the next morning?

- If the effect lasts at least until next morning, please give an example of the kind of sound that would cause this to happen.

3. Do you wear ear protection device (earplugs or earmuffs)?

- If YES, when do you wear ear protection?

- Why do you wear ear protection device?

- If ear protection is used for tinnitus, how often do you use earplugs or muffs for your tinnitus?

4. Are you currently undergoing any other treatment for your tinnitus?

- If YES, What ?

(Interviewer: This can be professional or self-administered “alternative” therapies, e.g., herbs, vitamins)

5. I'm going to discuss several activities that you might be involved in. Please let me know whether your tinnitus prohibits you from engaging in these activities or if it has any detrimental impact on them. (Prevented/affected/no effect)

- Concentration/Sleep/quiet resting activities (reading, relaxing, etc.)/Work/ Going to restaurants/Participating in or observing sports events/Social activities/ anything else?

6. In the last month, what percentage of your total awake time have you been aware of your tinnitus? Please provide an average percentage for the previous month.

Never aware 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% always aware

- Has this percentage changed since the start of treatment?

- How much of your total awake time were you annoyed/distressed/irritated by tinnitus in the last month? Please provide an average percentage for the previous month.

Not annoyed 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% of the time

- Has this percentage changed since the start of treatment?

7. How strong, or loud, was your tinnitus, on an average, over the last month? “0” would be “no tinnitus”; “10” would be “as loud as you can imagine.”

No tinnitus 0 1 2 3 4 5 6 7 8 9 10 extremely strong or loud

8. How much has tinnitus annoyed you, on an average, over the last month? “0” would be “not annoying at all”; “10” would be “as annoying as you can imagine.”

None of the time 0 1 2 3 4 5 6 7 8 9 10 all of the time

9. How much did tinnitus affect or impact your life, on an average, over the last month? “0” would be “not at all”; “10” would be “as much as you can imagine.”

None of the time 0 1 2 3 4 5 6 7 8 9 10 all of the time

10. Do you have any other comments about your tinnitus?

11. In terms of tinnitus and hearing, would you say your problem is the same, better, or worse over a period of time?

	Same	Better	Worse
Hearing			
Tinnitus			

12. Are you pleased/happy you started this program?

Audiologist to complete:

1. Indicate main problems discussed during this interview:

2. Recommendation:

3. Next visit: