

“Parables” used in TRT counselling.

We shamelessly borrowed this analogy from the Christian Bible, using every day experiences to explain how the brain and the auditory system reacts to different experiences, thoughts and beliefs.

PARABLES

Examples used during counselling

Reaction to a stimulus depends on the context

1. Motel

Imagine yourself, a tired and dusty traveler, arriving at a motel late at night asking for a room. You are told that there is one room remaining, but that it is currently being redecorated and there is no electricity connected. As you go towards your room with the key in your hand the owner remarks that there is also likely a hissing sound in the room due to the heating system which is also under repair. However it is fine with you. You are tired and have a peaceful and uneventful night.

Now imagine a second scenario in which everything is exactly the same up to the point when you are leaving the office for your room the owner remarks that a traveling circus visiting the area three days previously lost a pair of cobras, and they just found one of them two miles away from the motel. Imagine your experience spent during the night in this room when from time to time you are hearing a hissing sound coming from somewhere in the darkened room. Sleep is impossible, and the night is spent searching for the source of the sound ever fearful that it might be a snake. Even if the faulty heating system is discovered, there is still the anxiety that some of the sounds might be due to the snake. Exactly the same physical sound might produce a diametrically opposite reaction of the body depending on the context, and the interpretation of what is going on.

In a similar fashion the sound of tinnitus might produce an entirely different reaction depending on the context.

Reaction to stimulus depends on its associations.

2. Snakes in the grass.

If you are likely to be harmed by snakes, the ability to detect the sound of the snake becomes essential. Moreover early experience of watching snakes harming friends and relations resulted in the development of the reflex in which the extremely small sound of the snake evokes strong feelings of fear, and results in rapid movement in the opposite direction. Characteristically, these predators do not make much noise or they fail to find their lunch. The ability of the person living in this hostile environment to escape depends on being able to detect the very small sound of the snake when it is a long way off, and to react very rapidly. The ability to be able to react effectively requires strong feelings of fear elicited by this experience. This illustrates how a very weak signal can produce a powerful response in the limbic and autonomic nervous systems, if it has a significantly negative meaning. Moreover in the case of the snake there should not be easy habituation to the sound of the snake, because this could result in harm.

3. Inability to shift attention from a stimulus indicating danger.

Let us imagine that in the interview room, in place of a chair we have in the corner of the room, a live tiger. Even if I tell you that this tiger is very gently and he hasn't eaten any patients, since last week, and I'm instructing you to focus your attention exclusively on this important explanation of the neurophysiological model of tinnitus, so important for your treatment, you would not be able to avoid monitoring the behavior of this tiger even if you have a reasonable trust in my opinion. In this case a stimulus is placed high on the priority list demanding our attention, and we are subconsciously forced to monitor it's status, even against our will. Similarly tinnitus, once it has acquired negative associations indicating danger, is periodically forcing our attention on it, against our will, distracting us from other worthwhile tasks.

4. Busy executive and water cistern.

This is a true story reported by one of our patients. A busy executive was becoming more and more troubled by tinnitus so that during the day he was unable to work or concentrate and was contemplating giving up his career. We were surprised, when asking him about sleep disturbance, to discover that he had always been a bad sleeper, but since the tinnitus, he had been sleeping like a baby. After much puzzling he recalled that during his childhood he had a bedroom in the attic next to the water cistern of the house. Every night he would go to sleep with the quite loud hissing sound from the cistern in his ear. Once he began to experience tinnitus this was continuously intrusive and annoying during the day, but at night transported him back to the tranquillity and happiness of his carefree childhood and his attic bedroom.

In this situation the same sound (the unchanging tinnitus) has a completely different effect on the individual and his autonomic nervous system, in different situations, depending on the presence of other external stimuli and the change in environment. It has been established in behavioral psychology that stimuli consisting of several different components is treated as a new independent stimulus. As such, the trained reaction of the subject to this complex stimulus can be independent from the reactions produced by its individual components. In the above example the stimuli and events associated with going to bed produced a new complex stimulus which induced a feeling of tranquillity and safety. This happens despite the fact that one of the components of this complex stimulus, when put in the different context of the office, is extremely annoying.

5. Dark street in the middle of the night.

Walking down a dark street in a foreign city in the middle of the night, there is a strong tendency to listen for the smallest sound, and to be alarmed by the sound of a footstep, or a shadow in a doorway. All sensory systems are in a state of "red alert" with subconscious filters "wide open." Christmas shopping in a familiar and noisy street is a different affair where it is easy to collide with other pedestrians and be unaware of the noise of traffic and hustle and bustle, in our eagerness to return home. Monitoring filters are shut, and this is the time when you may lose your wallet or handbag! Auditory filters tend to open and monitor for threatening sounds when we are "under threat" from other life events.

6. New neighbour.

Imagine a new neighbor has moved next door. You exhibit mild interest to start with, but your anxiety increases very soon when you observe small packages being delivered to the front door on a regular basis by different individuals who quickly depart. You guess that your neighbour is perhaps a drugs dealer, and the prospect of spending many years next door to such criminal activity fills you with great alarm. You are constantly looking through the window monitoring the activities next door, and experiencing much anxiety and depression, by constantly thinking of the inevitable and desperate outcome for yourself and your young family of living next door to such a person. Some time later you learn quite by chance, that your neighbor is involved in collecting food parcels for the homeless. The realization that you have wrongly assessed the situation results in a sudden change of attitude. You lose your dislike for your neighbor, and stop monitoring his activities. You even feel foolish at your inappropriate initial assessment, realizing you are all too likely to think the worst of people.

Because of the common traditional beliefs about tinnitus being an untreatable disease, which can destroy life quality, it is very understandable that those perceiving it, often become anxious and depressed, and find it impossible not to monitor every tiny variation of its behaviour. Once the truth about tinnitus, its natural, benign and fundamentally normal origin is known and understood, all the unpleasant reactions gradually disappear.

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

7. Waiting room in Dentist's office.

Let's imagine that you are waiting in a dentist's waiting room expecting root canal work on a tooth. If at this moment, you are offered a delicious dinner to eat while you are waiting, you will have great difficulty in enjoying it, or even eating it. In this case fear induced by the anticipation of unpleasant treatment and pain is suppressing the appetite, and any other pleasant emotions which would normally be evoked by such an offer. Similarly, the presence of tinnitus which is inducing fear and has strong negative associations is suppressing the enjoyment of normal life and life quality, and through this mechanism has an enormously powerful impact on life quality.

Effect of prolonged continuous activation of the autonomic nervous system.

8. Hanging by your hands.

Hanging by your hands in the air from the edge of the roof may be acceptable for a short period of time, but will produce feelings of extreme exhaustion, over a longer period. Stimulation of the autonomic nervous system results in the preparation of the body for fight or flight. It involves the increased secretion of certain hormones, increased heart rate and respiration, and increasing muscle tension etc. At the same time activities associated with pleasure (positive reinforcement) are suppressed, we are losing appetite when we are frightened, or in a potentially dangerous situation. Similarly tinnitus producing even mildly elevated levels of activity in the autonomic nervous system, can produce high levels of exhaustion if present for prolonged periods of time.

Elevated autonomic nervous system activity impacting on sleep patterns.

9. Catching a plane in the early morning.

Let's imagine that you have to fly to a meeting in the morning which necessitates leaving the house at about 5:00 am. Several alarm clocks are set to ensure that you wake, your spouse is primed to wake you, and your colleague will telephone you at the same time. Despite all these precautions, typically your sleep will be very shallow and fitful during the night, and you will eventually become wide awake sometime before the alarm clock goes off. This reflects an elevated level of activity in the autonomic nervous system, preparing you to wake up on time and be ready for immediate action, in order not to miss the plane. Imagine having to repeat this scenario on a daily basis moving from one city to another, catching early morning planes. Going to bed early does not result in improving the quality of your sleep which will still be fitful and disturbed. Similarly tinnitus inducing even mild activation of the autonomic nervous system is promoting a prolonged "catch the morning plane" situation and might profoundly affect your sleep patterns.

Ability of the auditory system to detect and discriminate complex patterns.

10. Jigsaw puzzle.

One of the tasks of the cochlea is to convert the hundreds of thousands of different frequencies comprising complex sounds into electrical signals which travel up the individual fibers of the auditory nerve to the brain. In the auditory nerve leaving the cochlea there are patterns of activity which are very similar to the patterns of different sound waves, which have previously reached the ear. The information contained in the auditory nerve represents the raw data being presented to the central auditory system. As such it is similar to the pieces of jigsaw puzzle at the level of the auditory nerve where we can 'look in the box' and see that all the pieces are present, but not discern the picture which will be ultimately created by the pieces. As these neuronal patterns travel upwards through the auditory system towards the perceptual areas in the cortex there is a gradual assembly of this

information, just as the jigsaw puzzle is assembled by finding the outside pieces with straight edges, the sea, the sky, the people, the houses etc and putting these together before finally joining the whole puzzle as a complete picture. Similarly the detection of patterns of neuronal activity in the auditory system are grouped together so that the final perception consists of many different discreet components, coming from different areas of our environment. The assembly of these components takes place in the subconscious.

Pattern recognition and organization

11. Sound soup.

At any moment and time the combination of different frequencies of sound present in the ear canal represent all the sound activity in the environment wherever it comes from and however it is generated. This sound soup is represented by signals in the auditory nerve in a relatively unchanged form, apart from the fact that messages are coded as electrical impulses, rather than as an analogue of physical movements of structures within the ear. As the information ascends in the auditory pathways parts of this rich and diverse soup are extracted, bits of tomato here, bits of cauliflower there, with the bones from the soup 'stock' being generally discarded. Similarly important elements of the sound environment coded in this neural patterning are detected and extracted by the brain in a gradually increasingly complex manner as the cortical perceptual areas are being reached. Our ultimate perception is of a number of discreet, complete and nevertheless complex different auditory events which we can place precisely in our environment.

12. Japanese scanner story.

Let's imagine a Japanese mariner shipwrecked on a desert island who discovers a printed message in a bottle. He speaks no English and the paper is an English newspaper, with childish blue writing across it saying "I love Lucy" surrounded by pictures of flowers drawn by children's crayons. He attempts to solve the problem by using his portable Laptop with an attached colour scanner from which he obtains a computer file representing the image of the paper. He runs further programs which first removes anything which is not belonging to the category of printed or handwritten letters, and second compensating for distortion resulting from the paper spending many months in a bottle half full of sea water. The next stage of programming detects and recognizes all the letters rejecting any remaining parts of the image. Finally the program translates the English into Japanese reading it aloud via the sound card on the Laptop.

In this analogy the cochlea and cochlea nerve act similarly to the scanner transforming the page into an image, just as the auditory system transforms the patterns of sound into the patterns of neuronal activity reaching the cochlear nuclear complex in the brain stem, which is the beginning of the central auditory system. During the process of ascending the auditory pathways the significant patterns are extracted from the initial information with the remaining unwanted information rejected, and finally at a cortical level it undergoes translation (e.g., perception and evaluation) into a form which we can consciously perceive, understand and verbalize.

Importance of meaning versus loudness of signal

13. Baby crying at night; sound of first name.

All those who have raised a family or been a member of one, are familiar with the experience of the mother who wakes immediately in the night when her small baby makes a sound just before beginning to cry. In this situation it is not uncommon for the husband and other family members to sleep on, even through the crying of the baby. The quiet sound made by the baby has a very high level of significance to the mother relating to its protection and basic needs. These patterns of sound are selectively detected in the central auditory

pathways, and their enhancement is such that the baby's mother is woken from sleep, even having just slept through a thunderstorm.

Similarly we are all familiar with the sound of our first name being mentioned in a nearby conversation at a party or noisy meeting. We are unable to avoid being distracted by this short utterance which has no effect on our nearby neighbours who have different names. The constant repetition of our first name during an early stage of life results in strong programming of neuronal networks and central auditory pathways resulting in immediate, unconscious and reflex reaction to this utterance.

Gradual desensitization

14. Preventing sunburn.

Imagine that you are going to a country where it is impossible to avoid intensive exposure to sunshine, and you have a very pale skin. On arriving in the country immediate exposure to bright and powerful sunlight induces sunburn, and possibly severe illness due to sunstroke. One alternative to avoid this effect is simply to remain covered with a complete layer of clothes, use sun-screen and a very wide brimmed hat and dark glasses. As a result of this the skin remains highly sensitive and might even become more sensitive over periods of time. Another possibility is the gradual exposure to sunshine, using firstly a strong sun-screen and then gradually reducing this using weaker and weaker screens with the skin exposed to the sun. As a result of this approach the skin will gradually become less sensitive to the sun and eventually it would be possible to tolerate exposure without any extra protection.

The analogy in hyperacusis is that patients experience great distress when exposed to moderate or high levels of noise. Over protection of the auditory system from sound corresponds to the total protection from the sun scenario, and results in hyperacusis, or at best keeping hyperacusis at the same level for the rest of the patient's life. Providing patients with a gradual increase of sound from noise generators results in a gradual desensitization of the central auditory system, which can be tailored to the individual need of a patient.

Common sense reactions are not necessarily correct

15. Mexican food and over cooked rice story.

Let's imagine that you went to a famous Mexican restaurant and you ordered a new dish which you had never tried before, and which turned out to be extremely spicy. This resulted in a very upset stomach, spending the majority of the time over the next few days in the bathroom, and not even being able to think about eating. This results in an aversive reaction to food in general, and when finally hunger takes over, the inclination is to eat something very bland such as overcooked rice without salt, on its own. This tendency to stick to bland food persists for the next few days. Even when a normal diet is resumed this may have the effect of disturbing a stomach that is still very sensitive. In the case of food, hunger will eventually force us to establish a more normal pattern of eating. Unfortunately in the case of sound there is no mechanism corresponding to hunger, and the result is that a hyperacusis patient remains on a very "bland auditory diet" for prolonged periods of time. Prolonged consumption of the "bland auditory diet" results in a permanently sensitive auditory system.

Strength of perception depends on contrast

16. Birthday candle

Imagine entering a totally dark room in which there is just a single birthday candle lit in one corner. The candle appears to have a great brilliance in the otherwise darkened room.

Suddenly the blinds are drawn up behind the candle to reveal sunlight pouring through a window. The candle becomes virtually invisible.

Habituation: pattern matching

17. Brooklyn trains.

A true story. After the time that the overhead train lines in Brooklyn were being removed and placed underground, the police received an increasing number of calls about disturbances in the neighborhood, but nothing could ever be found wrong. The times of the calls coincided with the times the overhead trains used to pass through. People were awoken by the absence of an expected phenomenon, even though they were asleep (awareness “shut down”).

18. Trains at the bottom of the garden.

Some estate agents actually specialize in selling houses with trains running close by. Some people who have become habituated to the noise of trains at night, cannot sleep without them.

19. Dressing in the morning.

For a moment when you are getting up you stand naked. As you put on your clothes you stimulate millions of sensory nerve endings in the skin. The sensation of clothes touching lasts only a few seconds. Through the day you are unaware of the sensation, even though the skin receptors continue to send messages to the brain.

20. Kitchen smells.

You enter a kitchen full of wonderful cooking smells. You feel good (emotional response to sensory perception). You go outside and put your head in the dustbin. Different emotional response. You return to the kitchen and stand there chatting for a few minutes. You no longer smell the cooking. (Habituation of olfaction).

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

21. Floor board in the night.

Two people are going to sleep in similar old houses a country village. As it gets colder the floorboards creak due to movement from temperature change. In one house the lone occupant thinks: “lovely old house, going to sleep, just like me” turns over and goes to sleep. In the other house the occupant (possible more nervous, or having had experience of an earlier break-in) thinks “must be burglars!” Sleep is impossible until the house has been searched, and even then tends to be fitful.

New signals are always monitored

22. A new refrigerator.

You buy a new refrigerator. It is installed in the kitchen and you are worried by the noisy motor. You telephone the shop. Reassurance is always forthcoming, they are used to such calls. “Don't worry it takes 3 weeks for the new motor to run in, then it will be silent.” In 3 weeks you cannot hear the fridge even if you listen for it. The motor hasn't changed but the auditory system no longer monitors a sound (even an intermittent one) that has no meaning. This is an example of habituation of perception.

Unpleasant emotional responses to harmless signals. Desensitization schemes

23. House spider.

Many people are annoyed, irritated or even fearful (phobic) about spiders, or other small insects. House spiders in the U.K. are harmless and arachnophobes know this, but it doesn't help their aversive response. Many people get sweaty, palpitations and feel very tense (autonomic nervous system overactivity). The phobia usually stems from an early learning experience, e.g., finding a spider in your bath, or shoe, or having a similarly phobic parent. The aversion continues for many years, sometimes for life. Arachnophobes can spot spiders, where ordinary mortals can't see them (enhanced visual pattern matching).

If you want to overcome your fear, the strategy is to very gradually get closer to spiders, while constantly being reassured about their harmless nature, and while working hard on reducing your feelings of dislike. Ultimately the idea is to make spiders your friends! When that happens the phobia has gone. This process of habituation by desensitization cannot occur in the absence of the spider (compare with tinnitus and masking), and is made worse by "flooding," e.g., putting people in a room full of spiders. With tinnitus it is good to reduce the contrast of the tinnitus by sound reinforcement, but habituation cannot occur if the tinnitus is "masked" (suppressed by other sound), or significantly altered by noise generators. With spiders the change in belief about their true lifestyle, and their harmless nature is essential to process of habituation. So it is with tinnitus.

Cultural elements strongly affect our reactions

24. Meaning of tinnitus in rural India (true stories).

In parts of rural India there is a common belief that sounds in the head or ears signify that the gods are speaking to you and you are blessed. This, combined with a high degree of tolerance (e.g., to territorial intrusion), makes tinnitus a good thing rather than a bad thing. In cities, and those exposed to "western culture" tinnitus is again seen as a problem.

Among tribal people tinnitus cures are produced by conjurers who place a probe in the ear, and remove it with the offending insect tied to the end! This cure depends on your belief that there really is an insect in the ear. (We don't expect it works every time!)

Collect your own stories or parables! Its fun and VERY THERAPEUTIC both for you and your patient!

