

Sound Therapy is a listening program using music that is programmed with certain algorithms, found to have a profound and calming effect on the emotions and the nervous system.

When we experience trauma, habitual negative thought patterns are established which then cause alteration of the neuronal pathways in the brain. Research has proven that these pathways can be changed when certain brain centres are stimulated.

Stored emotions and associated repetitive thoughts can be released if the neuronal firing patterns associated with them are changed.

Research has established that:

- Stressful experiences can be locked into the auditory system
- Auditory memories can trigger reactions in the limbic system
- Remapping brain pathways changes emotional experience
- Left brain stimulation helps to lift depression
- Similar benefits to meditation can occur through Sound Therapy

### Stressful experiences can be locked into the auditory system

Just as emotional memories can be stored in muscle tissue, memories can also be locked away in our auditory system, according to Dr Tomatis, one of the first researchers to investigate the auditory environment of the foetus. His theory was that the auditory relationship between baby and mother lays the foundation for all our other relationships and is therefore the crucial point of intervention to bring about change in the person's psychological response to sound and language. The resolution of such memories is achieved through a re-opening of the auditory system. (Tomatis, 1991)

Other research has confirmed these premises. Studies have found that brain damage prevents the healing of emotional memories. (LeDoux, 1989.) Yet healing of suppressed traumatic memories can occur when they are able to be processed through the sensory system.

*"Repressed traumatic memories can often function within an unconscious system of sensory transfers and exchanges, a delicate*

*cognitive cryptography that, in transforming atrocious details into beautiful fragments, can also transform the traumatic event from an experience that destroys us into one that reconstitutes us, heightens our sensory awareness of the world, and makes us who we are. (Silent Jane, 2010.)*

The results of a study, which appeared in the journal of the Association for Psychological Science in 2008, indicate that the brain uses more efficient mechanisms in auditory memory than in visual memory. This infers that the human brain appears to be a keener detector of auditory change than visual change. (Demany, 2008.)

Auditory researchers agree that experience stored in auditory memory is



very profound and important for our emotional wellbeing.

*"You get the comfort hormone prolactin when you use music." Levitin says. "that's the same hormone that is released when mothers nursed their babies. It's soothing."*

Conversely, negative emotional states involve links between the auditory system and many brain centres concerned with negative emotions.

*"Pathophysiological processes underlying psychiatric disorders such as depression, obsessive compulsive disorder and in schizophrenia involves the basal ganglia and the connections to many other structures and particularly to the prefrontal cortex and the limbic system." (Stathis, 2007.)*

### The anterior cingulate cortex and attention

One structure of particular relevance to our mental state is the anterior cingulate cortex, a small asymmetrical part of the pre-frontal cortex.

The prefrontal cortex, just behind the forehead, is where we feel that our sense of identity and existence is positioned. The anterior cingulate cortex, (4 in the diagram) is the brain's emotional control centre and is relevant to our moods as it

gives us our ability to focus our attention internally on our own thoughts.

In depression, external stimuli become relatively meaningless compared to internal preoccupations. Such repetitive negative thinking is thought to be linked to this structure. (Carter, 2002.)

The brain of a depressed person lacks outside focus: the areas used for directing the attention to the outer world are deadened. The anterior cingulate cortex lights up when we concentrate, particularly on things that are generated inside ourselves, like pain, and is hyperactive in mania.

Recent studies have identified the anterior cingulate cortex as the part of the brain most activated by social rejection and the emotional pain this creates. (Posner 1994, Lieberman 2003.) Posner's theory is that in negative emotional states, a vicious circle is formed between the amygdala, the prefrontal lobe and the anterior cingulate cortex.

### Remapping brain pathways changes emotional experience

Researchers have discovered that "Music can lift the spirit and rewire the brain." (Holden, 2001.)

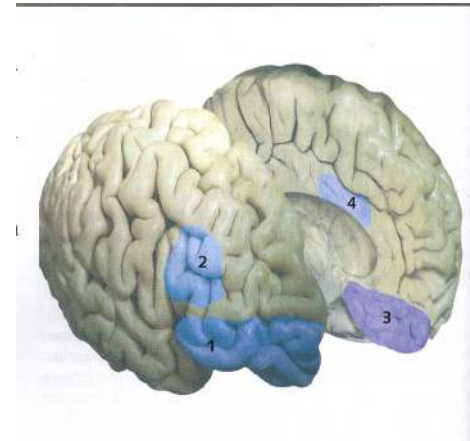
Tomatis, an ear doctor with a special interest in embryology, observed that the development of the brain is entirely integrated with the development of the ear. In fact it is through auditory linguistic stimulus, while still in the womb, (hearing the mother's voice) that the foetus forms large numbers of brain pathways.

Rather than the brain developing first and language subsequently being learned, brain structure is created as a result of language exposure. In fact much of the brain itself grows out of embryonic ear tissue. Therefore, Tomatis says, the brain is differentiated ear, rather than the other way around! (Tomatis 1991.) No wonder sound effects us so deeply!

There is proven evidence that music can be used to re-map brain pathways.

"The cerebellar of male musicians they found, were 5% larger than those of male nonmusicians.... It appears that "processing of music is much more distributed than one would expect from simple anatomy," says auditory physiologist Hubert Dinse at Ruhr University in Bochum, Germany." (Holden, 2001.)

Because of the way it stimulates a variety of different brain centres, music has profoundly beneficial effects on mood and state of mind. Blood and Zatorre



found that in response to the pleasurable effects of music...

"Cerebral bloodflow increases and decreases were observed in brain regions thought to be involved in reward/motivation, emotion, and arousal, including central striatum, midbrain, amygdala, orbito-frontal cortex, and ventral medial prefrontal cortex." (Blood, 2001.)

These linkages are a clue to the way that sound so profoundly effects the functioning of our entire nervous system and emotional responses, helping to resolve chronic grief, anger, depression and more, as numerous studies have shown.

"Findings indicated that music therapy was more effective in decreasing state anxiety than was an uninterrupted rest period." (Wong, 2001.)

"Studies, as well as clinical experience, have shown that musical intervention has been helpful in assisting patients with pain management in a variety of medical settings." (Presner, 2001.)

"A single music therapy session was found to be effective in decreasing anxiety and promoting relaxation. Subjects to receive music therapy reported significantly less anxiety ...than those subjects in the control group.... Heart rate and respiratory rate decreased over time." (Hinjosa 1995.)

### Left brain stimulation helps to lift depression

The long term practice of meditation allows a person to turn off areas of the brain that normally seek stimuli. Researchers also found an observable increase in certain areas in the left brain associated with positive emotions and a sense of wellbeing, peace and fulfilment. (Davidson, 1992.)

Sound Therapy specifically targets the left pre-frontal cortex and stimulates under-active brain areas by increasing the energy in the neurons, which in turn, it is thought, raises the level of excitatory neuro transmitters. The increased cortical activity allows the person to practice more balanced and wholistic thinking, inhibits negative recurring thoughts associated with the limbic system and results in more controlled and focussed behaviour.

### Similar benefits to meditation can occur through Sound Therapy

As an alternative to pharmacological drugs, stimulation of the nervous system is now being considered for treatment of mood disorders, as these researchers state:

"It is important to emphasize that the altered mood did not result directly from the depletion of the neurotransmitters as much as the result of inadequate firing of those cells in the brain." (Vidal, 2010)

"The results of the study indicate that music may be a cost-effective, risk-free alternative to pharmacological sedation." (Loewy 2005.)

The music of Mozart has been proven particularly beneficial in improving brain states.

"Results indicate a positive effect of listening to Mozart" and it worked whether they like it or not! (Jones, 2006.)

The use of particular selections of classical music with added filtration for Sound Therapy ensures such benefits. There is ample evidence that when used appropriately, music can change the physiology on which emotional states are based.

Research has shown that music can alter physiological variables like blood pressure, heart rate, respiration, EEG measurements, body temperature and galvanic skin response. Music influences immune and edocrine function. The existing research literature shows growing knowledge of how music can ameliorate pain, anxiety, nausea, fatigue and depression." (Mysaka 2000.)

"I've done things in the past year that I had been putting off for ten years" said a Sound Therapy listener. This effect of Sound Therapy to increase motivation, coordination and energy is believed to be, in part, due to an increase in dopamine being naturally generated by the brain.

The neurotransmitter, dopamine, is an essential factor for physical motivation and the ability to get up and go. Sound Therapy has been found to motivate people into more activity and overcome depression, so it is possible that it helps to stimulate dopamine production.

"I feel a new joy in living" said a Sound Therapy listener. More than any other

neurotransmitter, serotonin dysfunction has been implicated in depression. When we look at the effects of serotonin it looks surprisingly like a list of the reported benefits of Sound Therapy. An increase of good feelings, serenity and optimism are frequently reported by listeners.

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