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# ON THE BORDER

*Info & insights from the interface between energy healing & science*

## April 2015

Welcome to the April 2015 edition of 'On the Border'.

This month I am in a celebratory mood! On 17th April I turn 50, and I keep giggling about that fact. Fifty is a lot of years and always seemed 'old' to me. But now I am there I don't feel old at all. So I am doing a lot of chuckling to myself at this paradox.

In this month's On the Border I am celebrating to the sound of music: we are going to be taking an in depth look at he healing power of music. In a play on words, The Sound of Music was the film my mum was watching (for the 7th time) when her waters broke and I started to come into the world. As a result I have a particular affinity for the film and an uncanny fondness for '*Once on a hill was a lonely goatherd*'. I must remember to ask her *when* in the film it was…;=)

For those of you new to 'On the Border', this is Jayne's monthly Ezine newsletter about the latest information and insights into energy fields, healing and science. Each month I share with you some of the latest research and how it applies to healing, energy work & (daily) life. There is also a Fascinating Facts section and a 'Freebie' where you get something for nothing, gratis.

## Can Music Really Heal?

Across cultures and throughout history, music listening and music making have played a role in treating disorders of the mind and body. Much of the power of music-based treatment lies in its ability to meld numerous subtle benefits in a single, engaging package. Music is perhaps unrivaled by any other form of human expression in the range of its defining characteristics, from its melody and rhythm to its emotional and social nature.

The treatments that take advantage of these attributes are rewarding, motivating, accessible and inexpensive, and basically free of side effects, too. The attractive quality of music also encourages patients to continue therapy over

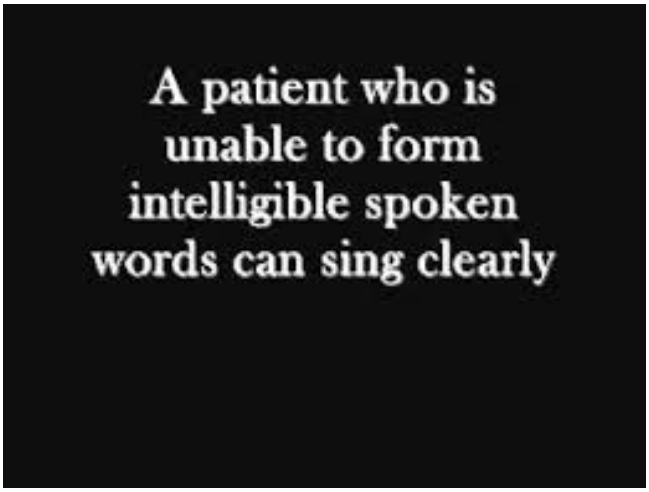
many weeks and months, improving the chance of lasting gains. These treatments aim to restore functions lost to injury or neurological disorders by enlisting healthy areas of the brain and sometimes even by reviving dysfunctional circuitry. As evidence accumulates about the effectiveness of these techniques, clinicians and therapists from a variety of fields have begun to incorporate them into their practices, most notably music therapists, who are at the intersection of music and health and important mediators of these interventions, as well as speech therapists and physical therapists. And among the beneficiaries are people diagnosed with stroke, autism, tinnitus, Parkinson's disease and dementia. As scientists learn more about the effect of music on cognitive and motor functions and mental states, they can tailor these therapies for each disorder, targeting specific brain injuries or dysfunctions.

## Music as Medicine

The view that music can be useful in treating neurological impairment gained some scientific heft in a landmark study published in 2008. Psychologist Teppo Särkämö of the University of Helsinki and his team recruited 60 patients who had suffered a stroke in the middle cerebral artery of one hemisphere. They split the patients into three groups: the first participated in daily sessions of music listening, the second listened to audiobooks every day and the third received no auditory treatment. Researchers observed the patients over two months. Those in the group that listened to music exhibited the greatest recovery in verbal memory and attention. And because listening to music appears to improve memory, the hope now is that active music making—singing, moving and synchronizing to a beat—might help restore additional skills, including speech and motor functions in stroke patients.

## The Singing Cure

When a stroke affects areas of the brain that control speech, it can leave patients with a condition known as nonfluent aphasia, or an inability to speak fluently. And yet, as therapists over the years have noted, people with nonfluent aphasia can sometimes sing words they cannot otherwise say.




In the 1970s neurologist Martin Albert and speech pathologists Robert Sparks and Nancy Helm recognized the therapeutic implications of this ability and developed a treatment called melodic intonation therapy in which singing is a central element. During a typical session, patients will sing words and short phrases set to a simple melody while tapping out each syllable with their left hand. The

melody usually involves two notes, perhaps separated by a minor third (such as the first two notes of “Greensleeves”). For example, patients might sing the phrase “How are you?” in a simple up-and-down pattern, with the stressed syllable (“are”) assigned a higher pitch than the others. As the treatment progresses, the phrases get longer and the frequency of the vocalizations increases, perhaps from one syllable per second to two.

Each element of the treatment contributes to fluency by recruiting undamaged areas of the brain. The slow changes in the pitch of the voice engage areas associated with perception in the right hemisphere, which integrates sensory information over a longer interval than the left hemisphere does; as a consequence, it is particularly sensitive to slowly modulated sounds. The rhythmic tapping with the left hand, in turn, invokes a network in the right hemisphere that controls movements associated with the vocal apparatus. Benefits are often evident after even a single treatment session. But when performed intensively over months, melodic intonation therapy also produces long-term gains that appear to arise from changes in neural circuitry—the creation of alternative pathways or the strengthening of rudimentary ones in the brain. In effect, for patients with severe aphasia, singing trains structures and connections in the brain’s right hemisphere to assume permanent responsibility for a task usually handled mostly by the left.

This theory has gained support in the past two decades from studies of stroke patients with nonfluent aphasia conducted by researchers around the world. In a study published in September 2014 by Schlaug and his group at Harvard Medical School, 11 patients received melodic intonation therapy; nine received no treatment. The patients who received therapy were able to string together more than twice as many appropriate words per minute in response to a question. That same group also showed structural changes, assessed through MRI, in a right-hemisphere network associated with vocalization. The laboratory is now conducting studies to compare the benefits of melodic intonation therapy with other forms of therapy for patients with aphasia.

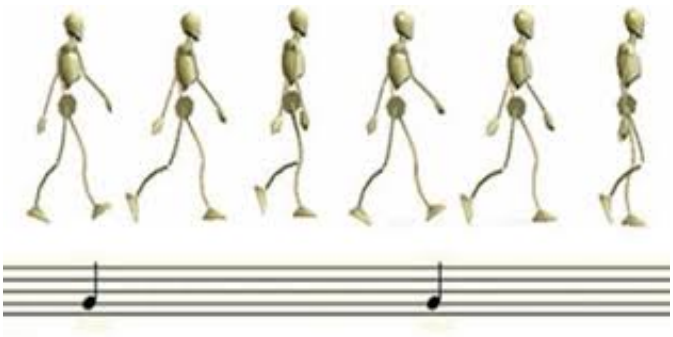
Because melodic intonation therapy seemed to work by engaging the right hemisphere, researchers then surmised that electrical or magnetic stimulation of the region might boost the therapy’s power. In two recent studies researchers stimulated an area in the right hemisphere called the inferior frontal gyrus, which helps to connect sounds with the oral, facial and vocal movements that produce them. For many participants, combining melodic intonation therapy with noninvasive brain stimulation yielded improvements in speech fluency after only a few sessions.

## Music and Motion

Music making can also help stroke survivors living with impaired motor skills. In a study published in 2007 scientists asked patients to use their movement-impaired hand to play melodies on the piano or tap out a rhythm on pitch-producing drum pads. Patients who engaged in this intervention, called music-supported training, showed greater improvement in the timing, precision and smoothness of fine motor skills than did patients who relied on conventional therapy. The researchers postulated that the gains resulted from an increase in connections between neurons of the sensorimotor and auditory regions.

Rhythm is the key to treatment of people with Parkinson's, which affects roughly one in 100 older than 60. Parkinson's arises from degeneration of cells in the midbrain that feed dopamine to the basal ganglia, an area involved in the initiation and smoothness of movements. The dopamine shortage in the region results in motor problems ranging from tremors and stiffness to difficulties in timing the movements associated with walking, facial expressions and speech.

Music with a strong beat can allay some of these symptoms by providing an audible rhythmic sequence that people can use to initiate and time their movements. Treatments include so-called rhythmic entrainment, which involves playing a stimulus like a metronome. In neurologist Oliver Sacks's 1973 book *Awakenings,* musical rhythm sometimes released individuals from their immobility, letting them dance or sing out unexpectedly.



The use of rhythm in motor therapy gained momentum in the 1990s, when researchers around the world demonstrated a technique called rhythmic auditory stimulation, or RAS, for people who had trouble walking, such as stroke and Parkinson's patients. A therapist will first ask patients to walk at a comfortable speed and then to an audible rhythm. Tempos that pushed patients slightly past their comfort zone yielded the greatest improvements in velocity, cadence and stride length.

Despite these encouraging outcomes, the neural mechanisms that trigger improvements have been difficult to pin down. Imaging work suggests that during rhythmic auditory stimulation, neural control of motor behaviour is rerouted around the basal ganglia; instead the brain stem serves as a relay station that sends auditory input to motor networks in the cerebellum, which

governs coordination, and to other cortical regions that could help synchronize sound and motion.

## Recovered Memory

Fewer neurological disorders inspire greater fear than dementia, one of the most common diseases of the elderly. According to some estimates, 44 million people worldwide are living with dementia, a number expected to reach 135 million by 2050. Alzheimer's disease, a neurodegenerative condition, accounts for more than 60 percent of the cases; multiple strokes can also cause so-called vascular dementia.


Music may be ideally suited to stimulating memory in people with dementia, helping them maintain a sense of self. Because music activates neural areas and pathways in several parts of the brain, the odds are greater that memories associated with music will survive disease. Music also stimulates normal emotional responses even in the face of general cognitive decline. In a 2009 study 12 individuals with Alzheimer's and 12 without it were asked to judge the emotional connotations of various pieces of music. The Alzheimer's participants were just as accurate as the others despite significant impairments in different areas of judgment. Other research suggests that taking part in musical activities throughout life keeps the mind young and may even decrease the risk of developing dementia; the continuous engagement of the parts of the brain that integrate senses and motion with the systems for emotions and rewards might prevent loss of neurons and synapses.

The type of therapy that individual dementia patients receive will vary, from receptive (listening) to active (dancing, singing, clapping). Music that the patient selects is most effective because the choice represents a connection to memory and self. The benefits vary, too, and tend to be short-term. But when the treatment does work, it reduces the feelings of agitation that lead to wandering and vocal outbursts and encourages cooperation and interaction with others. Music therapy can also help patients with dementia sleep better and can enhance their emotional well-being.

## Music on the Spectrum

Perhaps the most fascinating interplay between music and the brain lies in the case files of people with autism spectrum disorder, a neurodevelopmental syndrome that occurs in 1 to 2 percent of children, most of whom are boys. Hallmarks of autism include impaired social interactions, repetitive behaviours and difficulties in communication.

Indeed, up to 30 percent of people with autism cannot make the sounds of speech at all; many have limited vocabulary of any kind, including gesture.

One of the peculiarities of the neurobiology of autism is the overdevelopment of short-range brain connections. As an apparent consequence, children with autism tend to focus intensely on the fine details of sensory experience, such as the varying textures of different fabrics or the precise sound qualities emitted by appliances such as a refrigerator or an air conditioner. And this fascination with sound may account for the many anecdotal reports of children with autism who thoroughly enjoy making and learning music. A disproportionate number of children with autism spectrum disorder are musical savants, with extraordinary abilities in specialized areas, such as absolute pitch.

The positive response to music opens the way to treatments that can help children with autism engage in activities with other people, acquiring social, language and motor skills as they do. Music also activates areas of the brain that relate to social ways of thinking. When we listen to music, we often get a sense of the emotional states of the people who created it and those who are playing it. By encouraging children with autism to imagine these emotions, therapists can help them learn to think about other people and what they might be feeling.

Recently the Music and Neuroimaging Laboratory at Harvard developed a new technique called auditory-motor mapping training, or AMMT, for children whose autism has left them unable to speak. The treatments have two main components: intonation of words and phrases (changing the melodic pitch of one's voice) and tapping alternately with each hand on pitch-producing drums while singing or speaking words and phrases. In a proof-of-principle study, six completely nonverbal children took part in 40 sessions of this training over eight weeks. By the end, all were able to produce some speech sounds, and some were even able to voice meaningful and appropriate words during tasks that the therapy sessions had not covered. Most important, the children were still able to demonstrate their new skills eight weeks after the training sessions ended.

## Quiet, Please

Music-based treatments can also train the brain to tune out the phantom strains of tinnitus—the experience of noise or ringing in the ear in the absence of sound that affects roughly 20 percent of adults. Age-related hearing loss, exposure to loud sounds and circulatory system disorders can all bring on the condition, with symptoms ranging from buzzing or hissing in the ears to a continuous tone with a definable pitch. The sensation can cause serious distress and interfere with the ability to concentrate on other sounds and activities. There is no cure.

The past decade has seen a surge in understanding of the neurological basis of the disorder. In one view, cochlear damage (most likely caused by exposure to

loud sounds) reduces the transmission of particular sound frequencies to the brain. To compensate for the loss, neuronal activity in the central auditory system changes, creating neural "noise," perhaps by throwing off the balance between inhibition and excitation in the auditory cortex, leading to the perception of sounds that are not there. Also at play might be dysfunctional feedback to auditory brain regions from the limbic system, which is thought to serve as a noise-cancellation apparatus that identifies and inhibits irrelevant signals.

Music treatment seeks to counteract this dysfunction by inducing changes in the neural circuitry. For those with tonal tinnitus, one treatment involves listening to "notched music," generated by digitally removing the frequency band that matches the tinnitus frequency. The notching—pioneered and proved effective by neurophysiologist Christo Pantev and his group at the University of Münster in Germany—might help reverse the imbalance in the auditory cortex, strengthening the inhibition of the frequency band that might be the source of the phantom sound in the first place. Another approach involves playing a series of pitches to patients and then asking them to imitate the sequence vocally. As the patients refine their accuracy, they learn to disregard irrelevant auditory signals and focus on what they want to hear. In time, the stimulus of effortful attention might help the auditory cortex return to its normal physiological state.

For any novel therapy, enthusiasm can sometimes outpace the evidence, and researchers have rightly pointed out that the new music-based treatments must prove their efficacy against the more established therapies. But of all the techniques for addressing neurological disorders, music-based therapies seem unique in their capacity to tap into emotions, to help the brain find lost memories, to let patients resume their place in the world. We are only now beginning to understand the science behind the belief in the power of music to heal.

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## Fascinating Facts

You've just read that music is a uniquely effective tool for treating neurological impairment because it recruits nearly every region of the brain. Imaging studies show that both listening to and making music spur activity and foster connections across a wide swath of brain regions typically involved in emotion, reward, cognition, sensation and movement.

But did you know that…..here are seven ways music might work to benefit our mind and brain:

- **Music is Physical**: it encourages people to move with the beat. The more salient the beat, the more sweeping and emphatic the body movements. Physical exercise can help improve circulation, brain health, and fine and gross motor function.

- **Music is Emotiona**l: it induces emotional states by initiating changes in the distribution of neurochemicals that can induce positive moods and heightened arousal, which may in turn increase the rate of change in the brain, speeding rehabilitation.

- **Music is Engaging**: musical treatments are engrossing and rewarding, so patients are highly motivated to participate with enthusiasm, focus and dedication.

- **Music permits Synchronization**: it helps listeners synchronize rhythm (by tapping along) and melody (by singing along), addressing problems of timing,
- initiation and coordination in people with stroke, Parkinson's disease, and other brain disorders involving sensory and motor systems.

- **Music is Social**: musical activities can be collective experiences. Social isolation is a common consequence of many neurological disorders, and social support through music making helps in recovery, rehabilitation and coping.

- **Music is Persuasive**: it can make associated media such as lyrics and films seem more compelling. When patients believe in their treatment, their attitude tends to remain positive.

- **Music is Personal**: neurological impairment can make people feel that they have lost touch with them- selves. The personal nature of music can evoke memories and help individuals maintain a sense of identity.

## April Freebie

In this section you get the chance to get something for nothing. Helemaal gratis. Always a pleasure!

Keeping entirely in the theme of the healing power of music, here is a download link for a free 7-minute chakra tune up from internationally acclaimed sound healer Jonathan Goldman:
http://www.healingsounds.com/winterofwellness

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