

TAPPING INTO EMBODIED NEUROLOGICAL RHYTHM WITH MUSIC AND DANCE THERAPIES

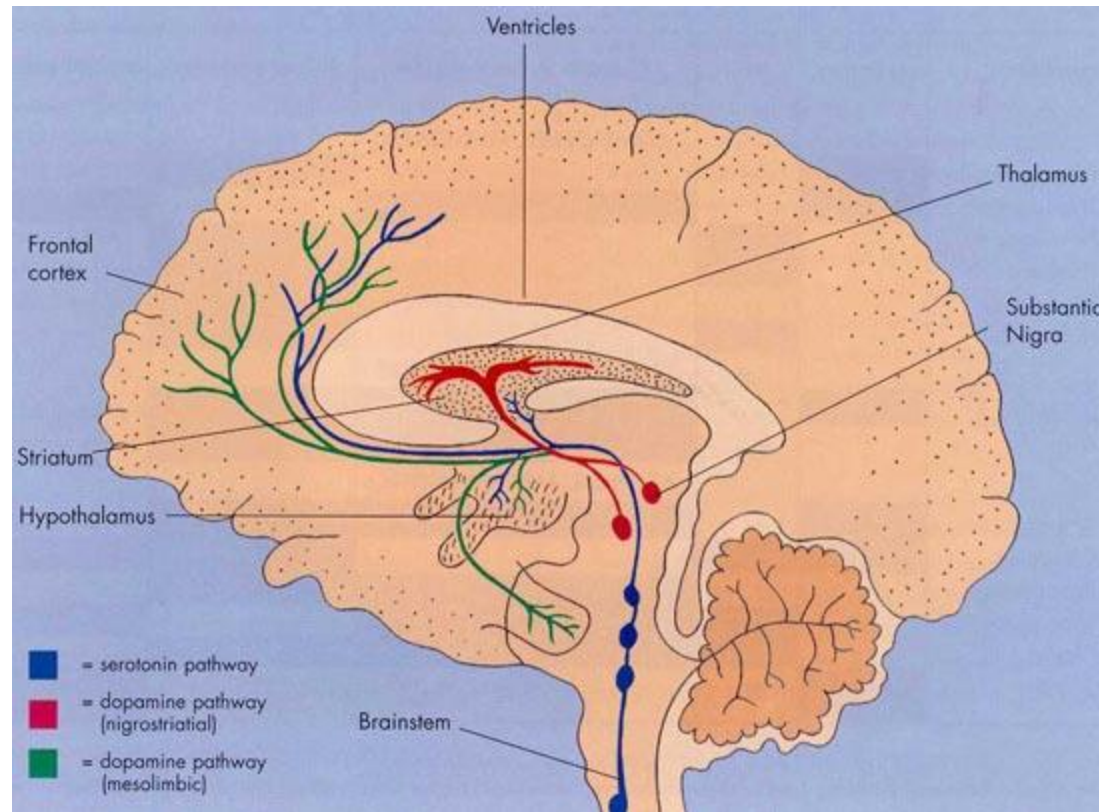
Dr. Julia Clark

Consultant Clinical Neuropsychologist

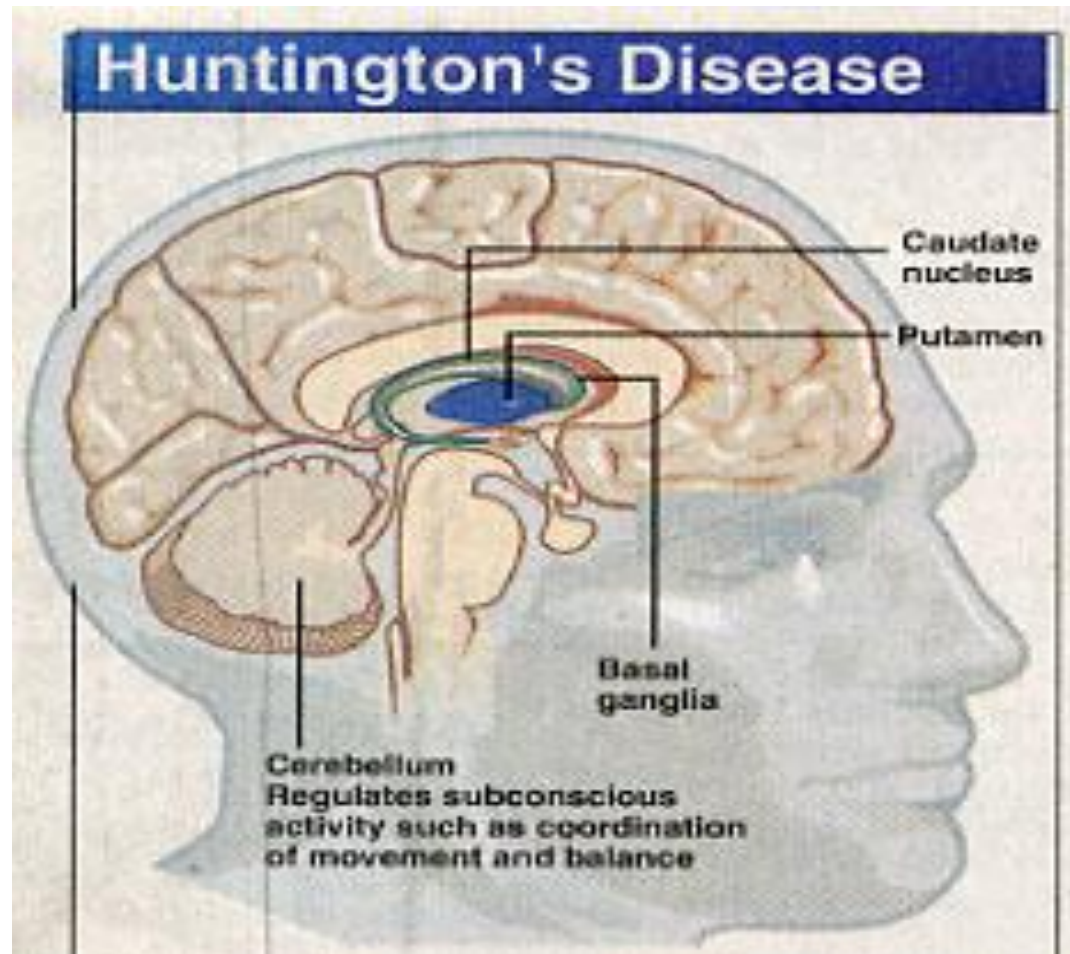
AIMS

- Gain a greater understanding of the control of movement at brain level
- Be aware of similarities between medical conditions that affect movement
- Discover the intimate neural connections between music and movement
- Appreciate the role that music can play in helping restore movement and emotion

Pathways affected by Parkinson's Disease



Pathways affected by Huntington's Disease



Motor pathways

Even though the causes are different the pathways affected are the same

Sub- cortical dementias

- When the parts of the brain controlling movement are damaged they cause what we call a sub-cortical dementia
- These neurological conditions such as Parkinson's Disease , Huntingdon's Disease and Motor Neurone Disease gradually rob people of the ability to move spontaneously
- They also rob people of emotional expression

LOCKED IN



What is locked in syndrome

- A condition causing complete paralysis of all muscles of the body except for those that control eye movement
- It is a result of damage to the motor pathways caused by trauma, stroke or sub-cortical dementias
- Intellectual function is for the most part intact

Words conveyed by the flicker of an eyelid



JEAN-DOMINIQUE BAUBY

Life after locked in syndrome

“I am alive, I can think and no one has the right to deny me these two realities”

Jean Dominique Bauby

Former Chief Editor of Elle

Paris

Why refer to music therapist?

- To improve controlled motor responses
- To allow emotional expression
- To improve mood

HOW DOES MUSIC THERAPY
WORK?

Evolution of music and movement

- Migration
- Echo-location
- Co-ordinate group activities
- Express emotion

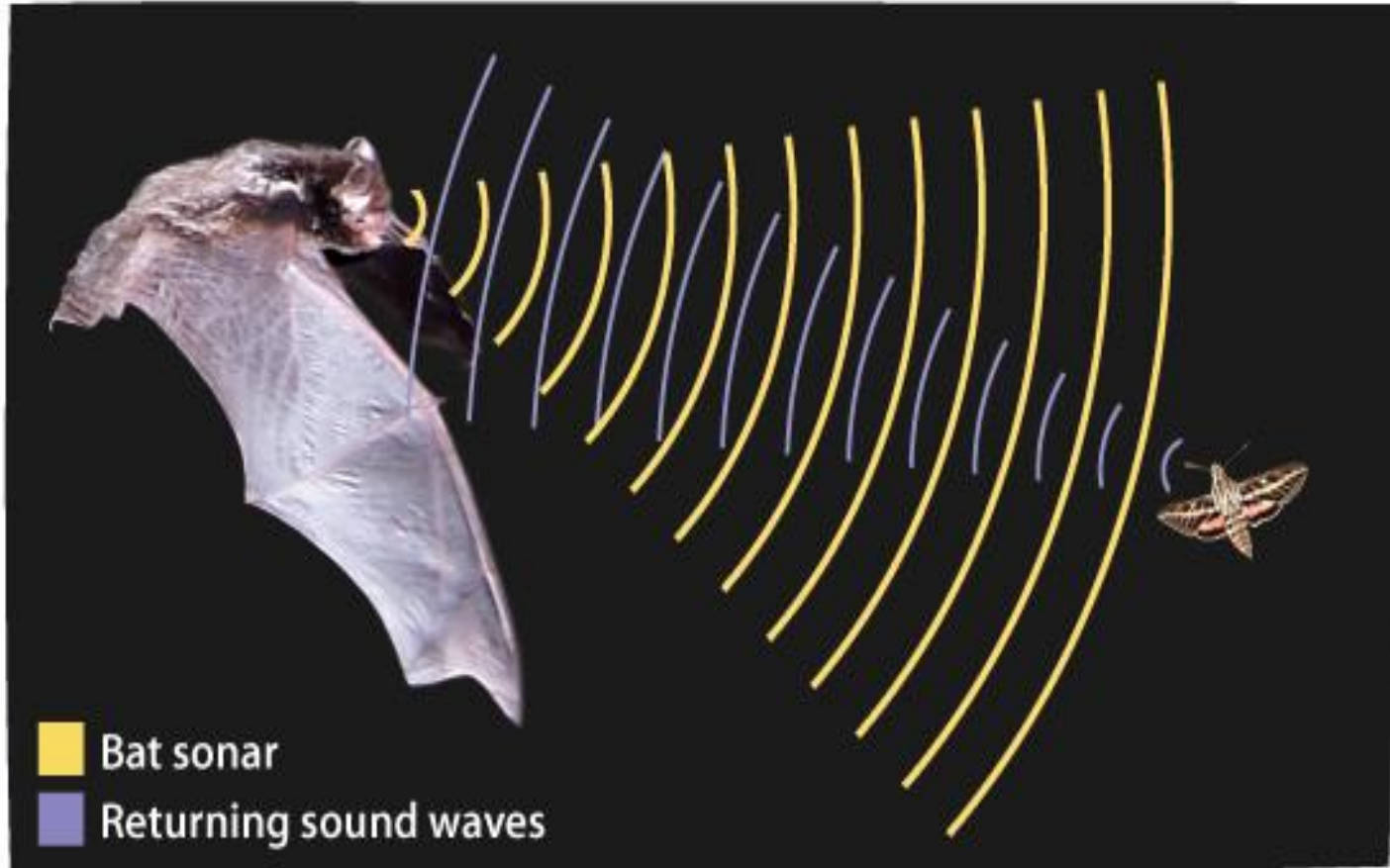
Bees



Migrating swallows



Bats



Pod of Whales



MILITARY CADENCE



Military cadence

- Gives energy
- Motivates
- Increase esprit de corps
- Singing cadences improves posture
- Improves efficiency of breathing

EXPRESSION OF EMOTION

love



Courtship



Ecstasy



ANNOYANCE



ANGER



MAORI BATTLE CHANT



HAKA

HAKA translates as hand action while singing.

It is a whole body symphony that can express

Courage

Annoyance

Joy

Music and movement pathways

Hearing



Movement patterns

Motor coordination

Emotional processing

Piper rhythm

Seeing

Commonalities

- Music and movement and emotion share pathways
- Music can act as a non-verbal emotional pathway
- Music can act as a carrier wave for the damaged Piper rhythm
- Music can restore movement

Case history

- Young woman age 22 years
- Brain stem damage
- Locked in syndrome
- Right thumb and eye control spared

1 year post injury

- Good communication by buzzer pressing, using computer and alphabet board
- Breathing independently
- Swallow reflex retrained

2 years post injury

- Communication by buzzer erratic
- Loss of synchronised swallow reflex
- Repeated episodes of aspiration pneumonia
- Tracheotomy tube re-inserted

5 years post injury

- Thumb flaccid , almost no buzzer use
- Rhythmic tongue movements
- Lack of engagement thought to be emotional withdrawal

Myorhythms

- Oculofacial and oculoskeletal myorhythmias are found in neurological conditions where there is damage to the brain stem - basal ganglia – motor cortex circuitry
- The development of myorhythms suggests loss of the orchestrating effect of the Piper rhythm

Movement is prevented

- Motor pathways between brain stem and brain surface become blocked
- Coordination of muscle contraction is lost
- Thumb downward movement too weak
- Communication with buzzer prevented

The amputated self

The self is neither the body nor the mind, it is active agency within the world ; it is prosthesis.

Through an artificial impression of embodied animation it is possible to rekindle a sense of self.

2000

Music therapy can reintroduce that sense of life and self to an individual who feels disembodied, absent and 'dead'.

Music Therapy

The planned use of music to meet an individual's

social

psychological

physical

spiritual

needs within an evolving therapeutic relationship

Magee, W. (2002). Identity in clinical music **therapy**: shifting self-constructs through the therapeutic process.

In R. Macdonald, D.J. Hargreaves & D. Miell (eds.), *Musical identities* (pp. 179-197). Oxford: oxford university press.

Music therapy

- Agreement to take part in music therapy obtained
- Initial assessment
- Appreciation of tone retained
- Physiological response to music tempo
- Music Therapy to begin August 2010

The Piper Rhythm

- Generated by a pace maker in the spinal cord or brain stem
- Orchestrates all muscle contractions by entraining and synchronising motor impulses
- Reduction and loss of the Piper Rhythm results in lack of motor fluency and failure to initiate movement

Getting moving

- When the motor pathways in the brain have been damaged the Piper rhythm is lost
- Structured sound bites allow movements to be initiated
- Auditory cues have been demonstrated to pre-empt movement by acting as Tau guides

Isabel Curran 2006

Replacing the Piper Rhythm

- Music with a strong regular beat can be used to replace the Piper rhythm
- Internal rhythms synchronise
- Muscles respond to the beat of the music
- Voluntary movement becomes possible

Music moves you in more ways than one



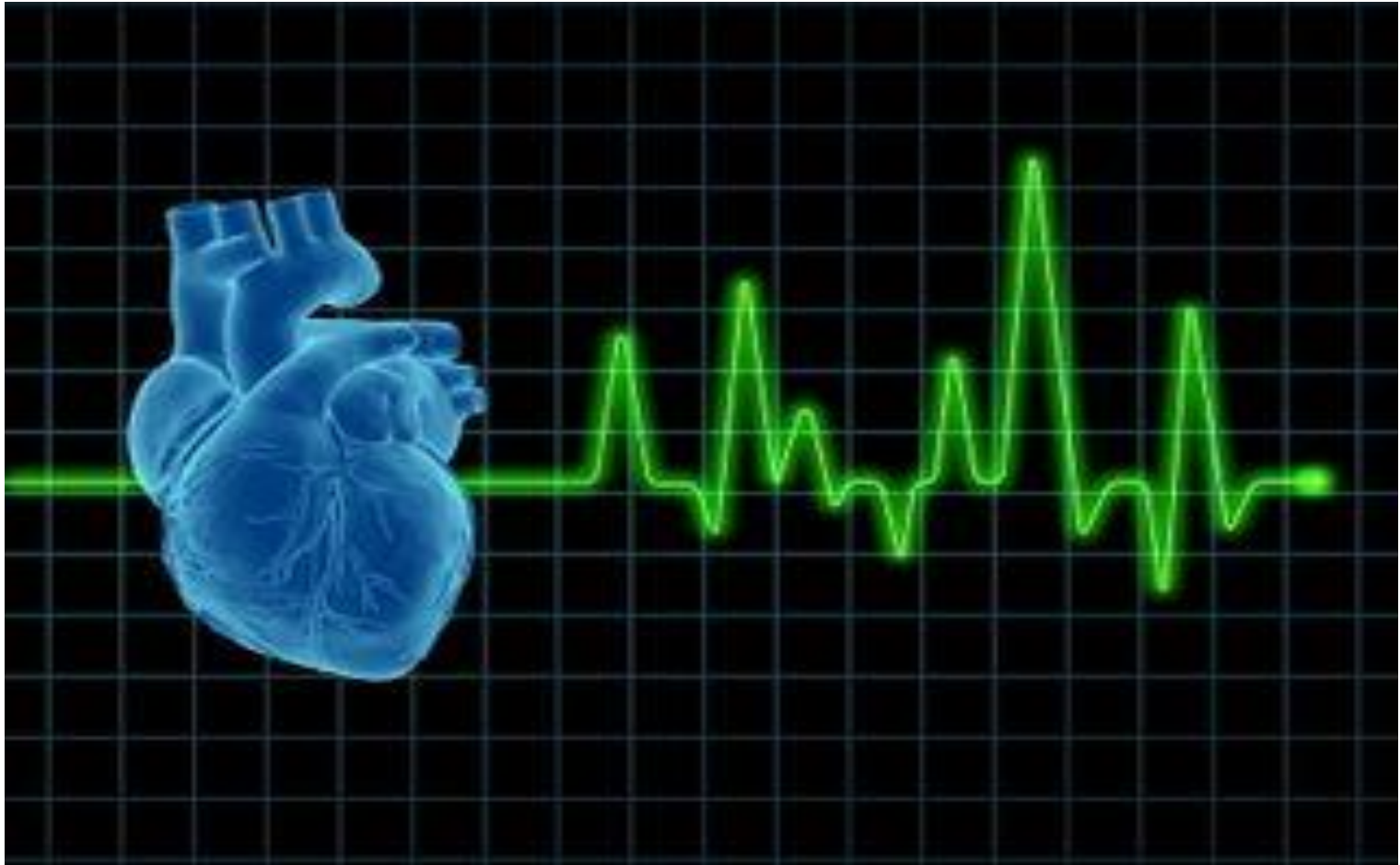
THE MOZART EFFECT



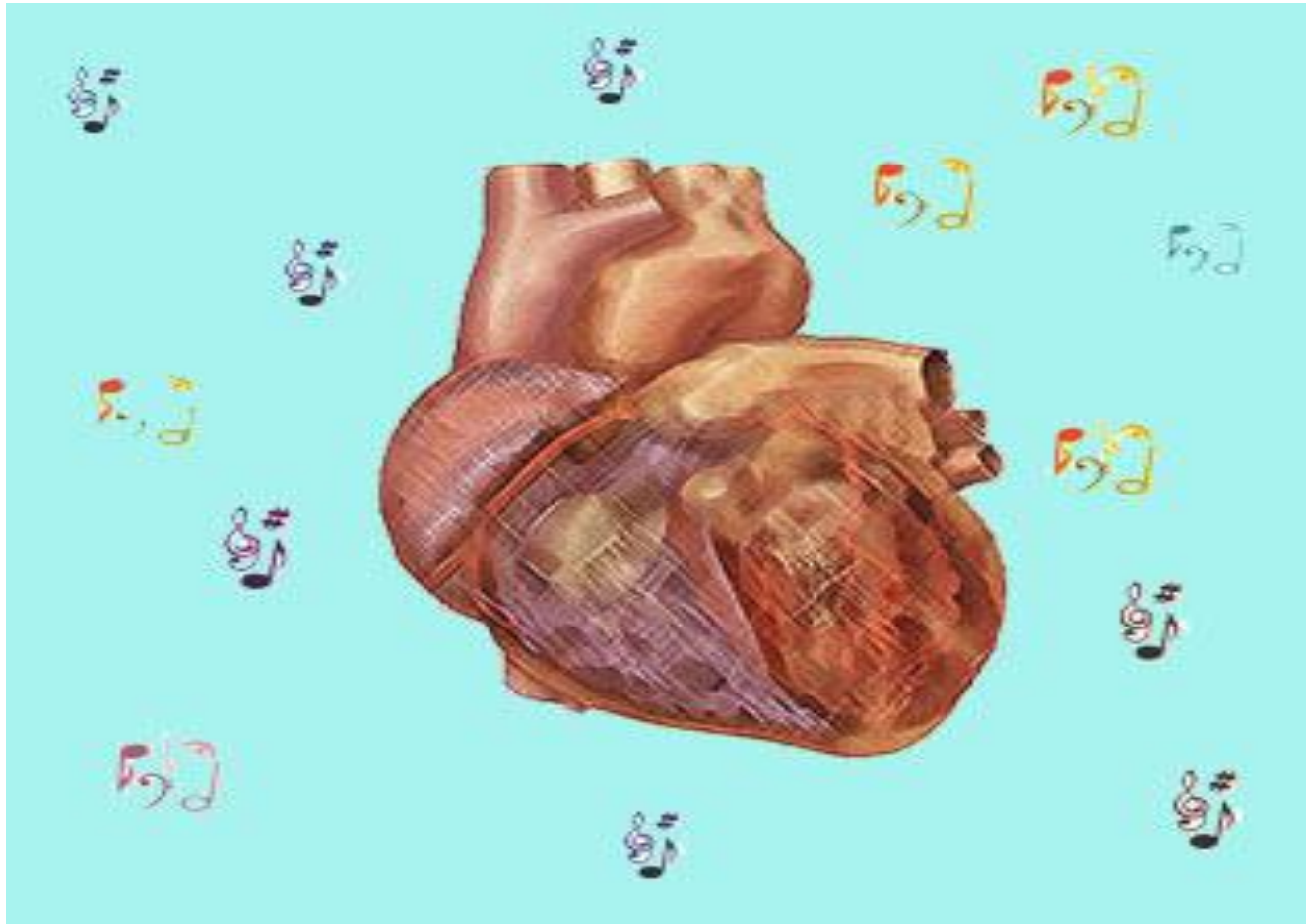
IMPROVING MOVEMENT

- Dopamine and serotonin are diminished in movement disorders
- Secretion of these neurotransmitters increases when Mozart compositions are played
- The **Mozart Effect** improves space-time reasoning

The heart is a muscle



Heart rate responds to musical beat



Calm Music

Increases the production of the hormone Oxytocin, the love hormone and reverses the effect of stress hormones

Entrainment of rhythms



- Calm music with a slow tempo such as classical Indian music slows breathing and heart rate
- The effect is reversed when there is a pause in the music
- Music preference is less effective than pace

Sleight 2006

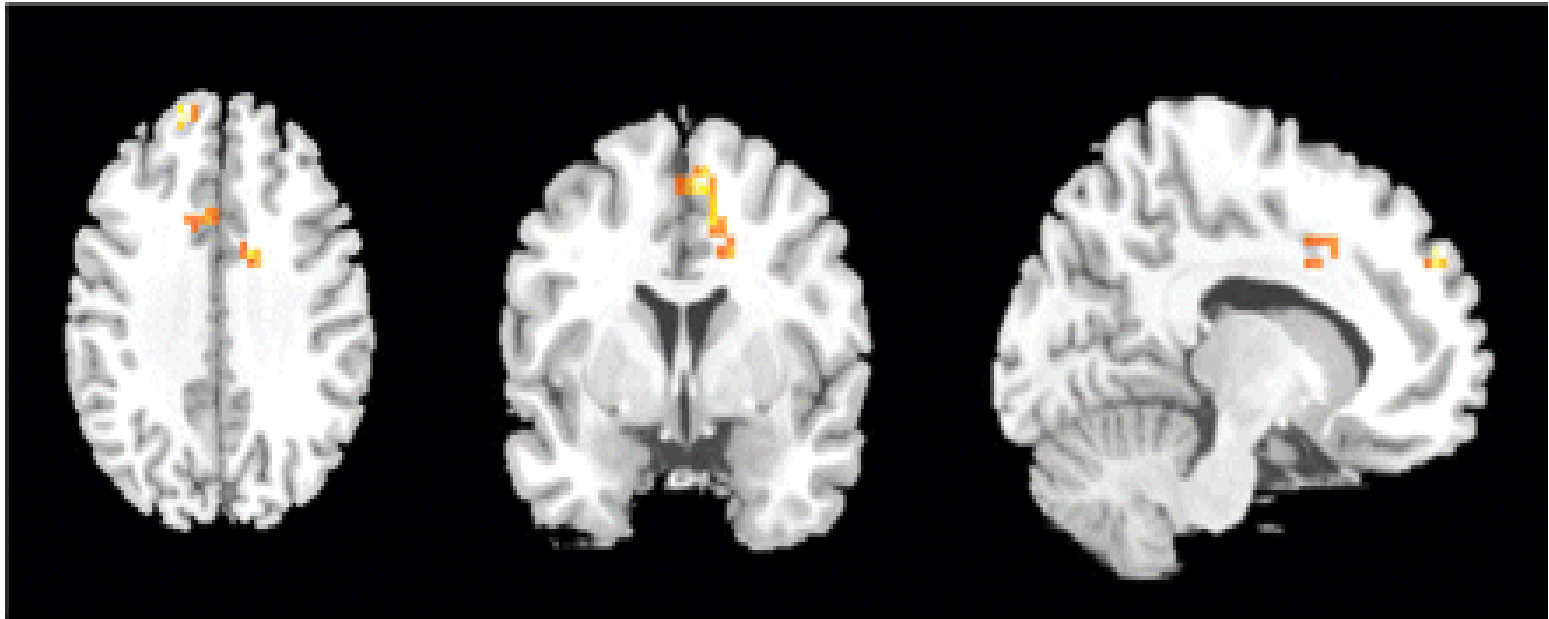


MUSIC MOVEMENT AND THE EMOTIONS

Repetitive Sound Meditation



fMRI Scan of Meditation



Meditation

- Increased attention - frontal lobe
- Decreased orientation to space- parietal

**THE QUICKEST WAY TO STILL THE
MIND IS TO MOVE THE BODY**

Gabrielle Roth

Repetitive movement meditation



Increased attention

Decreased awareness of body
position in space due to constant
whirling

People may forget what you say
but never forget how you make
them feel

Carl W. Buechner

Reciprocity and feed back loops

When your mood is high it makes you smile
Moving facial muscle into a smile actually
improves mood

It takes precisely 50 milliseconds to change
mood from sadness to happiness when you
hear happy music. This is reflected in facial
expression

Smiling makes you happy



But what if you cannot smile?

Mood enhancer



AND EVEN IF YOU DON'T FEEL LIKE
SMILING

Fake it till you make it

