Neurologic Music Therapy
Rhythmicity and Brain Function:
Toward a Scientific Model of
Music in Therapy
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Neurologic Music Therapy
A Research-Based System of Standardized
Clinical Techniques
• For:
  • Sensorimotor Training
  • Speech/Language Training
  • Cognitive Training

Neurologic Music Therapy
Basic Definitions
• NMT is defined as the therapeutic
application of music to cognitive,
sensory, and motor dysfunctions due
to neurologic disease of the human
nervous system.

Neurologic Music Therapy
Basic Definitions
• NMT is based on a neuroscience model
of music perception and production
and the influence of music on
functional changes in nonmusical brain
and behavior functions. (R-SMM)
Neurologic Music Therapy

Basic Definitions

- Treatment techniques are standardized and applied to therapy as Therapeutic Music Interventions (TMI) which are adaptable to the patient’s needs.

In addition to music therapy training, consortium university trained NMT’s are educated in the areas of neuroanatomy, physiology, brain pathologies, medical terminology, and rehabilitation of cognitive and/or motor functions.

Neurologic Music Therapy

Gait, Arm, Trunk, & Posture Training

- Techniques
  - Rhythmic Auditory Stimulation (RAS)
  - Patterned Sensory Enhancement (PSE)
  - Therapeutic Instrumental Music Performance (TIMP)

- Mechanisms
  - Audio-Spinal Facilitation
  - Sensorimotor Integration
  - Rhythmic Entrainment
  - Auditory Feedback
  - Patterned Information Processing (Sonification)

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Speech and Language Training

- Techniques
  - Melodic Intonation Tx (MMIT)
  - Musical Speech Stim (STIM)
  - Rhythmic Speech Cueing (RSC)
  - Vocal Intonation Tx (VIT)
  - Therapeutic Singing (TS)
  - Oral Motor and Respiratory Exercises (OMREX)

- Mechanisms
  - Differential Hemispheric Processing
  - Patterned Information Processing
  - Perceptual Sensory Priming
  - Rhythmic Entrainment

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Cognition: Attention and Perception

- Techniques
  - Musical Sensory Orientation Training (MOSOT)
  - Musical Neglect Training (MNT)
  - Auditory Perception Training (APT)
  - Musical Attention Control Training (MAC)
  - Selective
  - Sustained
  - Divided
  - Alternating

- Mechanisms
  - Patterned Information Processing (Gestalt Principles of Groupings)
  - Perceptual Sensory Priming
  - Rhythmic Attention
  - Auditory Information Processing

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Cognition: Memory Training

- Techniques
  - Musical Mnemonics Training (MMT)
  - Echoic Mnemonics (Immediate Recall, Sensory Register)
  - Procedural Mnemonics (Rules, Skills)
  - Declarative Mnemonics (Semantic, Episodic Memory)
  - Associative Mood and Memory Training
  - Mood State-Dependent Learning and Recall

- Mechanisms
  - Patterned Information Processing (Gestalt Principles)
  - Affect Modification
  - Associative Network Theory of Mood and Memory
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Cognition: Executive Functions Training

- Techniques
  - Musical Executive Function Training (MEFT)
  - Organization
  - Problem Solving
  - Decision Making
  - Reasoning
  - Comprehension

- Mechanisms
  - Patterned information Processing (Gestalt Principles)
  - Social Learning Theory

Cognition: Psychosocial Behavior Training

- Techniques
  - Music Psychotherapy and Counseling (MPC)
  - Mood Induction
  - Cognitive Reorientation
  - Affective Behavior Training
  - Social Competence Training
  - Musical Incentive Training for Behavior Modification

- Mechanisms
  - Affect Modification
  - Assoc’ Network Theory of Mood and Memory
  - Classical Conditioning
  - Operant Conditioning
  - Social Learning, Theory

Audio-Spinal Facilitation

- Motor Responses to Music - (i.e. tapping your foot, fingers, etc.)
- Audio-Spinal Facilitation - Rhythmically structured sound patterns, such as a simple dance tune in 2/4 meter, can entrain the timing of muscle activation patterns, as measured by electromyography (EMG), facilitating more efficient movement during rhythmic movements (gait, hopping, & skipping).

Physiological Entrainment

- Physiological Entrainment - Occurs when the frequency of activity of one system determines the frequency of activity in another system. Internal oscillator (internal time-keeper) entrains to a more powerful external oscillator (metronome or music). (Haas & Distenfeld, 1986; Miller et al., 1996).

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Rhythmic Auditory Stimulation

- RAS - (Rhythmic Auditory Stimulation)

- RAS is a specific technique to facilitate rehabilitation of movements that intrinsically are biologically rhythmic. One of the most important of these rhythymal movements is gait. Therefore, the most prominent application of RAS is to gait disorders, e.g. in stroke patients, Parkinson's patients, and traumatically brain injured patients.
Neurologic Music Therapy
Therapeutic Instrumental Music Performance

- TIMP - (Therapeutic Instrumental Music Performance)
  - TIMP uses the playing of musical instruments to exercise and simulate functional movement patterns in motor rehabilitation. Musical instruments and their appropriate spatial configurations are selected to emphasize and train range of motion, endurance, strength, adduction/abduction, supination/pronation, flexion/extension, digit dexterity, limb coordination, etc.

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Patterned Sensory Enhancement

- PSE - (Patterned Sensory Enhancement)
  - A technique using rhythmic, melodic, harmonic, and dynamic elements of music to provide temporal, spatial, and force patterns to structure and cue functional movements. The auditory-musical patterns or 'kinematic compositions' are derived from translating all components of the kinematic patterns of the movement in space, time, and force into sound patterns. For example, the rhythmic patterns simulate the timing patterns of the movement, pitch patterns simulate changing spatial positions, and harmonic and dynamic patterns simulate applications of force and muscle tone. PSE has its equivalent in sports training in the concept of 'sonification'. PSE can be used to structure in time, space, and force any functional movement patterns and sequences, regardless of intrinsically rhythmic or discrete, of the upper trunk, arms, hands, or whole body, e.g., reaching and grasping, and lifting motions, sit-to-stand.