

Neurogenic Communication Disorders Treatment: Speech-Language and Music Therapies in Harmony

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Guiding Values

Successful collaboration is not the result of a simple formula. Rather it involves trial and error, persistence, open-mindedness, willingness to go beyond typical professional expectations, and understanding and acceptance of scope of practice...to provide the best services for the clients...who can benefit from an eclectic treatment approach. (Hobson, 2006)

Attempts to separate tests and interventions into two mutually exclusive proprietary domains are destined to fail in the provision of the highest quality of service to the patient. No discipline should dictate or attempt to legislate the practice of another without getting into "restraint of trade" issues. Ultimately, the focus of collaborative efforts must be on the clinical utility of information and how professionals with complementary knowledge and skills can affect functional outcome for patients in a beneficial manner. (ASHA, 2003).

Introduction and Purpose

The role of music as a contributor to healing and a facilitator of communication has ancient roots (de l'Etoile, 2010; Sacks, 1998). Oppenheim, a German neurologist in the 19th century, is credited with the earliest linkage of aphasia and music in assessment and treatment (Graziano, Pech, Hou & Johnson, 2012). More recently, recognizing the importance of treating soldiers who returned from World War II with neurogenic communication disorders, rehabilitation research, largely within the Department of Veterans Affairs, intensified in the disciplines of both speech-language pathology and music therapy (Davis & Gfeller, 1999; de l'Etoile, 2010; Freed, 2010; Rau & Fox, 2009).

Speech and music have long been thought to have similar properties, and with development of neural imaging techniques we have new ways of understanding common neural substrates that may underlie music and communication recovery (Fridriksson, Baker & Richardson, 2010; Patel, 2005; Hartley, Turry & Raghavan, 2010).

Patient-centered care is maximized by collaboration among rehabilitation professionals (ASHA, 2010; Page & Morris, 2012; WHO 2010). Speech-language pathologists have a history of collaboration with neuropsychologists, occupational therapists and physical therapists but may be unfamiliar with the role of music therapists and even less so with neurologic music therapists (Hobson, 2006a; b). While both disciplines use elements of music such as rhythm and melody to provide treatment for persons with neurogenic communication disorders, increasing understanding of the common and unique contributions of each towards patient-centered care is important. Effective collaboration between MTs and SLPs requires understanding of the unique skills and knowledge that each field can bring to patient care (Hobson, 2006a).

Project Goals

- Define Music Therapy (MT) and Neurologic Music Therapy (NMT), highlighting key concepts between speech and music in neurology and syntax, and therapeutic implications as speech-language pathologists and music therapists collaborate.
- Compare impairment-based and activity/participation-based treatment techniques.
- Discuss examples and obstacles in collaboration between SLP, NMT and MT.

Music Therapy

*the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program (AMTA, 2011)

*an established health profession in which music is used within a therapeutic relationship to address physical, emotional, cognitive, and social needs of individuals.

*provides avenues for communication that can be helpful to those who find it difficult to express themselves in words.

Neurologic Music Therapy (NMT)

*therapeutic application of music to cognitive, sensory, and motor dysfunctions due to neurologic disease of the human nervous system.

*based on a neuroscience model of music perception and production and the influence of music on functional changes in nonmusical brain and behavior functions. (*Training Manual for Neurologic Music Therapy, 1999*)

Where words fail, music speaks. Hans Christian Andersen

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Speech/Language Domain

Neurologic Music Therapy		Common ICF Codes		Example Speech-Language Pathology Intervention	
Intervention	Descriptions	Targets		General Approaches	Specific Approaches
Musical Speech Stimulation (MUSTIM; CBRM, 2012)	* Phrase completion * Initiate familiar song lyrics, word associations and tunes * Elicit functional responses (e.g., "You are my.....")	* Expressive verbal output * Word finding problems * AOS	Word finding (b167/b310/b330) Articulation (b320)	* Sentence completion * Multimodality language stimulation * Cognitive neuropsychological foundation * Intersystemic reorganization	Schuell's Stimulation Approach (Coelho, et al., 2008) Thematic Language—Stimulation Therapy (Morganstein & Cerner-Smith, 2008) Language Oriented Treatment (Shewan & Bandur, 1986) 8 Step Continuum (Rosenbek et al., 1976) Sound Production Therapy (Wambaugh & Nessler, 2004) Singing therapy (Keith & Aaronson, 1975)
Rhythmic Speech Cuing (RSC; Thaut, 2005)	* Prime speech patterns * Pace rate of speech * Metronome or music and/or hand tapping or drum playing	Dysarthria * Motor coordination * Intelligibility Apraxia of speech * Motor planning Fluency disorder * Pacing	Articulation (b320) Fluency and rhythm of speech (b330)	* Rhythm or rate practice * Intersystemic reorganization	Finger counting (Simmons, 1978) Metronomic Pacing (Wambaugh & Shuster, 2008) Metronomic pacing plus hand tapping (Wambaugh & Martinez, 2000) Rhythmic control (Brendel, Ziegler & Deger, 2000) Stress patterning (Tjaden, 2000) Rate control (Yorkston, Beukelman & Bell, 1988) Vibrotactile stimulation (Telage & Fucci, 1973) Pacing board (Helm, 1979) Alphabet supplementation (Duffy, 1985)
Vocal Intonation Therapy (VIT; CBRM, 2012)	* Relaxation, breathing, and intoned voice control exercises * Vocal exercises such as singing a five note scale and gradually moving the pitch up or down	* Inflection * Pitch * Breath control * Timbre * Phonation * Voice dynamics	Articulation (b320) Range of sounds (b3401) Voice functions (b310)	* Control of respiration, stress, or prosody	Contrastive stress drills (Rosenbeck & LaPointe, 1985) Vocal relaxation exercises (Duffy, 1995; Dworkin, 1991) Phonation exercises (Duffy, 1995; Dworkin, 1991)
Melodic Intonation Therapy (MIT)	* Melody and rhythm to produce words and phrases in series of steps	* Verbal expression	Word finding (b167/b310/b330) Articulation (b320) Fluency and rhythm of speech functions (b330) Conversation (d350)		Melodic Intonation Therapy
Therapeutic Singing (TS; CBRM, 2012)	* Singing activities	* Initiation, development, and articulation * Respiratory function	Increase participation in favored leisure pastime (d920) Fluency and rhythm of speech functions (b330) Articulation (b320)	* LPAA type activities (e.g. singing a meaningful song or participating in singing group)	Singing to finish treatment session (ASHA Leader, June, 2012) Finding a Voice: Aphasia Tones (Bernstein-Ellis et al., 2012) Stroke-a-Chord chorus (www.strokeachord.com) Singing in the Rain Chorus (http://www.youtube.com/watch?v=4yPWYUPPEE0) Singing Group (www.Aphasia.ca) Singing therapy (Keith & Aaronson, 1975)
Symbolic Communication Training Through Music (SYCOM; Thaut, 2005)	* Musical exercises to train communication rules for comprehension and expression	* Communication behaviors (e.g. dialoguing, questioning and answering)	Conversation (d350) Social relationships (d750)	* Pragmatic language and communication treatment	PACE (Wilcox & Davis, 1980) Script training (Youman et al., 2005) Simulated situations (Green, 1984). Context-based therapy (Hinckley, Carr & Patterson, 2001) Conversational Coaching (Holland, Hopper, & Rowega, 2002) Reciprocal Scaffolding (Avent & Austerman, 2003) Everyday conversation treatment (Wilkinson & Wielert, 2012) Self-coaching (Ylvisaker, Szekeres, & Feeney, 2008)
Cognitive Domain					
Musical Attention Control Training (MACT; Thaut, 2005)	* Structured exercises using musical elements to cue responses	* Focused, sustained, selective, alternating, and divided attention	Attention functions (b140) Focusing attention (d160)	Treatments to improve the components of memory	Direct Attention Training, (Sohlberg, Kennedy, Avery et al. 2003) Attention Training Program (Helms-Estabrooks & Albert, 2004) Marshall Auditory Comprehension Training Program (Marshall, 2003)
Musical Executive Function Training (MEFT; Thaut, 2005)	* Musical improvisation * Composition exercises	Executive function skills	High level cognitive skills (b164) Integrative language functions (b1672)	Meta-cognitive strategy instruction	Everyday Routine-based Approach (Ylvisdaker, Szekeres & Feeney, 2008) Goal Management Training (Levine & Robertson et al., 2000)

Relationships Between Speech, Language and Music

Literature in neuroscience, auditory perception, music, and speech-language pathology is replete with papers addressing the relationship between speech, language and music from several perspectives, most notably common neurology, underlying syntactic structure (music and language), and music (broadly defined) in behavioral treatment (music therapy and speech-language therapy). To begin to understand the foundation for the speech-language-music-communication relationship we conducted a non-exhaustive literature review to identify studies that support the relationship in close and far manners.

Common neural pathways for speech, language and music

Close support: Fadiga, Craighero & D'Ausilio, 2009; Patel, 2012;

Schlaug, Marchina & Norton, 2009

Far support: Fedorenko, Behr & Kanwisher, 2011

Structural similarity in syntax of music and syntax of language

Close support: Patel, 2005; Schön & Francois, 2011

Far support: Zatorre, Belin & Penhume, 2002

Music (intoning, rhythm, singing) as therapy for language and communication behavioral change

Close support: Aldridge, 1989; de l'Etoile, 2010; Schlaug et al., 2009; Tomaino, 2010; Vines, Norton & Schlaug, 2011; Wan & Schlaug, 2010

Far support: Hurkmans, de Bruijij, Boonstra, Jonkers, Bastiaanse, Arendzen & Reinders-Messelink, 2011; Magee, Dileo, Wheeler & McGilloway, 2010; Stahl, Kotz, Henseler, Turner & Geyer, 2011; Straube et al., 2008

Melodic Intonation Therapy

In the beginning...

Albert, Sparks & Helm, 1973; Berlin, 1976; Sparks, Helm & Albert, 1974; Sparks & Holland, 1976
Theoretical foundations: adaptation of auditory and temporal modalities; contribution of nondominant right hemisphere

Treatment elements: melodic line, rhythm, points of stress

Participants: 12 individuals with severe aphasia

Procedure: four levels each with multiple steps; verbal and hand tapping stimuli; and criterion for task progression

Clinical Practice: mind the principles; follow the procedures; modify to meet the needs of individual patients according to provider's skill (Sparks & Holland, 1976, p. 288)

Through the years...

Theoretical foundations: original theory respected

Treatment elements: generally maintained; examined in research studies (e.g. phrase length, Laughlin, Naeser & Gordon, 1979; individual modifications at all levels— the Marshall Modification, Marshall & Holtzapfle, 1976)

Participants: many over the years

Procedure: levels generally maintained; modifications in three elements (e.g. home treatment, Goldfarb & Bader, 1979)

Clinical practice: patient-specific modifications per original treatment description; no gold standard MIT treatment protocol

Current research and practice in speech-language pathology...

Theoretical foundations: examined behaviorally and with neuroimaging techniques to determine treatment contribution to neural change (e.g. Belin et al., 1996; Carlomagno et al., 1997)

Treatment elements, procedure and clinical practice: theoretical foundation generally maintained; procedure specifically modified

New directions: Examine hemispheric contributions through neural imaging (e.g. Schlaug, Norton, Marchina, Zipse & Wan, 2010); neural stimulation as adjuvant treatment (Vines, Norton & Schlaug, 2011)

Clinical practice: despite many clinical publications, methods are inconsistent resulting in lack of systematic evidence to support neural mechanisms or behavioral elements supporting speech and language change (van der Meulen et al., 2012)

MIT in Neurologic Music Therapy...

Theoretical foundations: original theory respected (Thaut, 2005)

Treatment elements: rhythm, points of stress, increased variation in melodic line, melodies unique to phrases and based on prosody of spoken phrase (Thaut, 2005)

Procedure: phrases appropriate to client; humming and hand tapping; therapist sings alone, joint singing, therapist fades; call and response; prompt; questions (CBRM, 1999); full sentences used early (Conklyn et al., 2012)

Clinical practice: 7 Principles of Language: progression of steps, simple error correction, repetition, appropriate timing and controlled latencies, avoid familiar melodies, verbal utterances limited, frequent sessions (CBRM, 1999)

Speech-Language Pathology & Neurologic Music Therapy Collaboration

Multi-disciplinary, interdisciplinary, and transdisciplinary, models that vary across acute, inpatient and outpatient rehabilitation centers (Hobson, 2006)

*Neurologist, neuropsychologist, or SLP refers patient to music therapy

*NMT joins team treatment planning/discussions and family meetings

*SLP and NMT co-treat during sessions

*SLP and NMT see patient at different times, but communicate about goals and progress

*SLP and NMT treat separately, do not share goals

Potential Barriers

Issues and challenges common to any rehabilitation collaborative effort: scheduling, communication among team members, reimbursement, coordinated goal setting, familiarity with other professions

Reimbursement for MT is still being established within the traditional funding sources of Medicare and private insurers

More education, information about the roles and services of each other's field, and coordinating care important to decrease the risk of unnecessary duplication or fragmentation of services. (ASHA 2007)

Speech-Language Pathology and Neurologic Music Therapy Future

Investigate best practices for joint treatment for persons with neurologic communication disorders

Collaborate to refine treatments and outcomes through ICF

Develop interprofessional education promoting better understanding between professions of NMT and SLP