Developed with:

Music Therapy Protocols
A Neurologic Approach to Clinical Application

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An Introduction to the 
Beamz Music Therapy Protocols: 
A Neurologic Approach to Clinical Application

I. About the Author

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Neurologic Music Therapist-Fellow

Rebecca is a Massachusetts native who earned her Bachelors of Music in music therapy at Berklee College of Music in Boston, MA and her Masters of Education at Harvard University in Cambridge, MA. A board-certified music therapist, she achieved her fellowship in neurologic music therapy, and is certified in neo-natal music therapy and music therapy assisted child birthing. She contracts for MusicWorx, Inc. and developed the curriculum for Resounding Joy’s Semper Sound Military Music Therapy program and designed the current protocol for their Junior Joy Giver Training program. Rebecca frequently travels throughout the United States lecturing at universities, academies, regional, and national conferences. Rebecca has a passion for international music therapy and has traveled to Japan, Africa, India, and journeys annually to Jamaica to explore music in different cultures and facilitate music therapy services in schools, orphanages, hospitals, and infirmaries. As Resounding Joy’s Director of East Coast Programs and National Military Consultant and Liaison, Rebecca is developing the Resounding Joy East Coast Office, starting with the Semper Sound Military Music Therapy program. Rebecca has been a music therapy advocate for the Beamz Interactive Music Unit since she started using the Beamz clinically in 2009. She featured the Beamz in her first book, “Group Music Therapy Interventions Working in Neurologic Rehabilitation” of the MusicWorx Toolbox Series, which lead to this ongoing collaboration with the Beamz to develop music therapy protocols that can be effectively applied in clinical practice, specifically, working with traumatic brain injury and those who are recovering from trauma.

II. Contributors

**Barbara Reuer, PhD, MT-BC/L**

Dr. Reuer is known internationally for her expertise in music-centered wellness and music therapy. A graduate from the University of Iowa, she is Founder and Director of MusicWorx, a consulting agency based in San Diego, CA, and has more than 35 years of clinical experience in schools, convalescent facilities, retirement homes, hospices, medical and psychiatric hospitals, corrections facilities, substance abuse and eating disorders programs, health spas, as well as teaching at community colleges and universities. More recently, she has established Resounding Joy, Inc., a non-profit organization, to provide supportive and healing music environment for adults and children who are homebound or have special needs. Major areas of Dr. Reuer’s current professional involvement are in the area of music therapy program and job development in San Diego County including an international
music therapy internship program. In addition to her clinical work, she provides workshops and seminars (wellness, community building, stress management and pain management) nationally and internationally for health care professionals, educators and corporate clients. She has authored and co-authored several books and articles. Public notice of her work extends from recognition in publications to the Lifetime network show, New Attitudes, and the UCSDTV Health Matters: Music and the Mind. She has been interviewed in print media and television at the local, national and international levels. Dr. Reuer is a 2008 Southern California Cancer Pain Initiative Awardee for excellence in pain management. She has served as President of the National Association for Music Therapy and is recipient of the American Music Therapy Association’s national Professional Practice Award in 2000 and the Lifetime Achievement Award in 2008. In 2006, she was awarded by her peers the Betty Isern Howery Award, at the Western Regional AMTA conference, the highest award for professional contribution in the field of music therapy in the region.

Derlin Hsu, MM, MT-BC
Neurologic Music Therapist

Derlin is a board-certified music therapist who received a B.A. in Psychology and music from the University of California, San Diego. She then worked as a behavioral instructor, providing one-to-one early intervention Applied Behavior Analysis services for children with autism and pervasive developmental disorders in San Diego. After her work in San Diego, Derlin returned to school to receive her Masters equivalency degree in music, with emphasis in Music Therapy from Colorado State University, Fort Collins. There, she focused on Neurological Music Therapy. After doing her internship in Sacramento, CA, she joined the MusicWorx and Resounding Joy staff.

Al Ingallinera, Jr., MBA

Al is the Vice President of Marketing and Product Management for Beamz Interactive, Inc. He is collaborating with MusicWorx to the define usage objectives for the Beamz Music Therapy Protocol collection and the use of Beamz technology and interactive music within the protocols and the collection as whole. Al has extensive experience marketing technology products for consumers, business and specialized healthcare applications. Al earned his MBA from the Robert H. Smith School of Business at the University of Maryland and received his BBA from the University of San Diego.
III. Acknowledgements

Special thanks to the following people and respective facilities for field-testing the Beamz Music Therapy Protocols for effectiveness, patient outcomes, and providing important insight regarding protocol implementation and follow-up: Hannah Bronson, MT-BC; Tim Boelter, OT; Alissa Cramer; Learning Services, Inc.; the many military treatment facilities and veteran’s centers in Southern California; Resounding Joy’s Semper Sound Military Music Therapy Program; MusicWorx’s Neurologic Music Therapy Program; Benjamin Tourtelot, Sgt (Ret) USMC. To all of the clients who helped our learning process through field-testing, thank you so much! This publication is a testament to your diligence, dedication, and hard work in your journeys of recovery and rehabilitation. We applaud you!

Clinical Acknowledgement: The NMT interventions referenced in the text are suggested examples, not exemplars, of NMT techniques. The therapist is advised to use their clinical discretion based on client objectives to which the following are more applicable to different parts of the protocols.

For further information regarding earning certification in Neurologic Music Therapy, contact the Center for Biomedical Research in Music at Colorado State University, Fort Collins at http://cbrm.colostate.edu/contact-us/.

IV. Overview of Protocols

a. Summary of Protocol Structure
The Beamz Music Therapy Protocols developed with MusicWorx, Inc., provide “stand alone” and “progressive” music therapy interventions of clinical applications for music therapists to facilitate neurologic-based music therapy sessions and general health and wellness therapy sessions with the Beamz Interactive controller. Internal interventions and evaluation tools are included in each of protocols. Within the “progressive” protocols there are three levels of intervention to assess various levels of functioning and ability of clients. The A sections - “Foundational Exercises”- serve as warm-up interventions, wherein, if the clients are able to complete these basic functional tasks, they move on to the B sections - “Intermediate Level,” which increases in task demand and difficulty; success is determined by the completion of the A section and the interventions are based from A sections. If the clients are able to successfully complete B section interventions, they move on to sections C, “Expert Performance,” which is the final level of the protocol. Although the segments of protocols are progressive and can be used as a foundation for the next, they can also be used independently, if music therapist assesses that it is appropriate for the clients.

b. Protocol Usage Recommendations

Progressive Protocols

1. Active Music Making - This protocol is designed for music therapists to facilitate music making and performance exercises using the Beamz Interactive Music System in a group setting. This protocol aims to assist participants in developing sociobehavioral skills and learning rules of appropriate engagement and communication skills in a group dynamic. This protocol is based on neurologic music therapy (NMT) interventions including: Therapeutic Instrumental Music Performance, Musical
Neglect Training, and Musical Executive Function Training. It is designed as an assessment tool for determining clients’ musical preferences, processing, and retention.

2. **Cognitive Individual** - This protocol is designed for music therapists to facilitate cognition exercises using the Beamz Interactive Music System with an individual. This protocol aims to promote pattern recognition from rhythmic stimuli, cognitive sequencing of rhythms, and initiation and sustainment of attention for memory formation. It engages the players in various sequential exercises that stimulate cognition, sequencing, and temporal recognition based on neurologic music therapy (NMT) interventions including: Auditory Perception Training, Musical Attention Control Training, and Musical Executive Function Training. It is designed as an assessment tool for determining the client’s focused attention and memory recall.

3. **Cognitive Group** - This protocol is designed for music therapists to facilitate cognition exercises using the Beamz Interactive Music System in a group setting. This protocol aims to initiate and sustain focused attention and engage the players in cognitive exercises that encourage memory activation, sequence recall, and tools to facilitate musical mnemonics based on neurologic music therapy (NMT) interventions including: Music Attention Control Training, Music Executive Function Training, and Auditory Perception Training. It is designed as an assessment tool for tracking clients’ ability to simultaneously engage in the activities presented while maintaining focused attention with multiple concurrent stimuli.

4. **Music Production** - This protocol is designed for music therapists to facilitate music production techniques through engaging exercises using the Beamz Interactive Music System in a group setting. This protocol aims to assist participants in learning about music sequences, understanding new and different styles/genres of music, and working in a group dynamic. This protocol is based on neurologic music therapy (NMT) interventions including: Therapeutic Instrumental Music Performance, Musical Executive Function Training, and Associative Mood and Memory Training. It is designed as an educational tool, provides methods to establish client preference, and assesses clients’ sequencing skills.

5. **Sensorimotor** - This protocol is designed for music therapists to facilitate sensorimotor exercises using the Beamz Interactive Music System in a group setting. This protocol aims to initiate motor movement, promote group cohesion through synchronized activities, encourage leadership through participant facilitation, and promote spatial awareness of participants’ bodies relative to their surroundings. This protocol is based on neurologic music therapy (NMT) interventions including: Pattered Sensory Enhancement, Therapeutic Instrumental Music Performance, and Auditory Perception Training. It is designed to assess clients’ motor ability, frequency of entrainment, and ability to make musical associations to physical self.

**Stand Alone Sessions**

1. **Creativity Through Songwriting** - This protocol is designed for music therapists to facilitate creativity through vocal expression and communication skills using lyric writing and vocalization exercises with the Beamz Interactive Music System in a group or individual setting. This protocol aims to promote self-insight and expression as it pertains to communication and developing aptitude for self-advocacy. It engages the participant in utilizing various speech and language abilities. It is designed to assess basic needs, quality of life, and coping mechanisms. In addition to
the creative process of songwriting, facilitated by music therapy (NMT) interventions of Musical Executive Function Training and Associative Mood and Memory Training, this protocol engages the participant in utilizing the inherent instrument of the voice through the NMT intervention of Therapeutic Singing.

2. **Health & Wellness** - This protocol is designed for music therapists to facilitate deep breathing, autogenic relaxation, and imagery exercises using the Beamz Interactive Music System in a group or individual setting. This protocol aims to teach stress-reduction strategies and engage the participant in utilizing various forms of relaxation. It is designed to monitor pre and post session pain, anxiety, and depression.

c. **Introducing Beamz In Therapy Sessions**

i. **Laser Beams** - The Beamz Interactive Music System is a recreational music making product that enables anyone to experience making music by touching laser beams and “playing light.” The Beamz controller uses red class 2 laser beams, so they are safe to look at and to touch – and it’s a fun and interesting way to make music that doesn’t require learning any specific playing techniques.

ii. **How it Works** - The Beamz Interactive Music System includes pre-programmed interactive songs comprised of instrument samples, vocals and sound effects that have been created and paired for use with an interactive song specific rhythm track. As players touch a laser beam, the music samples programmed to be triggered with that laser beam are added into the playback of the rhythm track, with everything harmoniously paired and in time with a specific interactive song. Song use recommendations for therapists are included in each of the “stand alone” and “progressive” protocols.

iii. **Everyone May Play** - Beamz is designed for musicians and non-musicians to use and enjoy. For the musician, there are opportunities to create more complex music through deliberate play of the interactive songs – and opportunities to combine Beamz use with traditional instruments and digital music interfaces in conducting therapy sessions and for broad group activities. For the non-musician, Beamz provides an opportunity to make rich sounding music without having learn music theory, techniques, or develop skills specific to playing a traditional instrument.

iv. **Focus** - The greatest benefit of all is the focus on the music and the physiological association; the mind-body connection. When playing Beamz, there is no tactile feel, no pressure, and no physical strength required to touch the laser beam and to trigger the instrument and sound effects playback. This provides increased opportunities for client focus by removing physical requirements in using a traditional instrument. The laser beams also enable clients to participate in music making that may not possess the physical skills for using some traditional instruments.

v. **Recording** - The Beamz software provides the opportunity to record performances to use the recorded samples (WAV and MP3) in any digital media player and for participants to have copies of their music making experiences to enjoy and to share.
d. **Interdisciplinary Team Integration**

Given its recreational music making orientation and direct learning curve, Beamz is an impactful tool for music therapists to collaborate with other therapists and professionals providing rehabilitative, educational, and care services, including occupational therapists, educators, and life skills trainers. From an occupational therapy vantage point, music making simultaneously engages participants in multiple tasks utilizing: visual perception, memory, tracking, and scanning; motor integration, range of motion, and upper body strength; cognitive recall, memory, and attention span. Music provides motivation for movement and engagement; and the Beamz provides approachable and accessible means to experience making music.

Music is a naturally social experience. Combine the Beamz with life skills training and experience skill building acceleration for interpersonal/social skills, executive function (inhibitory control and decision making), and team building/cooperation.

In education the opportunities are vast; Beamz immediately enables anyone of any skill level and/or physical abilities to use music to experience creativity and a means of personal expression.

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**Occupational Therapy**

**Group Cognitive Protocol:** Group Session
Field-tested on 9/24/2014 at Marine Corps Base in California

**Music Therapist Observations:** “It was a successful session. It would be beneficial to spread these over multiple sessions or to have at least 90 minutes for this to complete successfully. Clients were challenged and engaged. It would be helpful to have an additional facilitator there to keep metrics.”

**OT Feedback:** “This is a great exercise on working memory. The marines were engaged and you could really see them working on remembering where the different instrument beams were. I would want to see this done over multiple sessions to track how much they are retaining. I feel that with proper training, I could run this protocol with clients. The internal evaluations are great and I would also recommend the Rivermead cognitive test, which uses visual, verbal, and spatial measures.”

**Client Feedback:**

**Client #1:** “This thing is awesome! I want to make it into a game to play at home with my family. Maybe even in this group we can make it a game 1:1 or 2:2.”

**Client #2:** “I saw this thing and wanted to run, but I am glad that I stayed because it was really fun!”
**Active Music Making Protocol with Sensorimotor Considerations - hybrid session:** Individual
Field-tested on 10/02/2014 at Learning Services, Inc. in Escondido, CA

**Music Therapist Observations:** “It was amazing to watch as the client graduated from prudently eyeing the Beamz at the outset of the session to playing excitedly, not only the Beamz, but the harmonica and both simultaneously. He was activating motor function working on his goals of reaching and sitting up straight, as well as achieving bilateral movements. Playing the harmonica along to the Beamz rhythm track provided respiration support and it improved his overall mood as evidenced by his feedback and his affect and disposition after the intervention was done.”

~Rebecca Vaudreuil, EdM, MT-BC

**OT Feedback:** “This device [The Beamz] challenged the client’s multi-tasking skills, motor planning and sequencing skills, as well as encouraging accurate visual motor skills for reaching to break the beam. He was noted to stick with this activity beyond the time frame when he often stops due to fatigue in other motor activities I’ve done with him. He also smiled more than he ever does with motor training activities! I was impressed that when his favored upper extremity tired, he was motivated to use the non-favored upper extremity to continue making music. He often refuses to use this extremity during other traditional upper extremity exercises. I know that he activated trunk muscles to maintain a functional seated position that allowed for more ease in reaching. With another, more mobile person, I could totally see using the Beamz thing for working on improving posture, and for functional sitting balance training.”

~Tim Boelter, Occupational Therapist

**Client Feedback:** “At first I was enjoying watching you [music therapist] and Tim [occupational therapist] play, but then once I started playing I really got into it and it was a lot of fun! I didn’t feel like I was working so hard.”

**Life Skills Trainers**

**Sensorimotor Protocol:** Group Session
Field tested in 10/02/2014 at Learning Services, Inc. in Escondido, CA

**Music Therapist Observations:** “This was a fun session that stimulated the imagination and engaged the clients though intentional movement and active listening while supporting individuals in the group dynamic.”

~Derlin Hsu, MM, MT-BC

**LST Feedback:** “I had a lot of fun with this helping the clients and for myself! The clients were getting along and having fun together. Music therapy group is often one of the only times that they work together so well and it is wonderful to see. I see them really trying to do the tasks that the music therapists create for them and this [Beamz] is a good motivator.”

**Client Feedback:** “This was really good. I liked hearing the instruments and doing the motions to play them. It was a fun game!”
Music Therapists and Educators

Creativity Through Songwriting Protocol: Individual

Music Therapist/Educator Feedback: “Ben has been songwriting in music therapy since 2009. Collectively, we have released two CDs for him; however, the production component has been driven greatly by my knowledge of technology and Ben’s inability to autonomously run some of the recording software available at the present time. Incorporating the Beamz Unit into the songwriting process has allowed Ben to take control of the musical portion of creating his accompaniment and adding instruments that he selects for different portions of the song. Using even just the Beamz app in his iPhone (without the unit) has provided Ben with a variety of genres that he can write songs to. Even if he doesn’t use the exact song the way that it is arranged in the Beamz, it provides him with ideas and ignites his musical process, encouraging him to create!”
~Rebecca Vaudreuil, EdM, MT-BC

Client Feedback: Benjamin Tourtelot

First session with Beamz: “We are going to have a lot of fun with this instrument, I can tell!”

Second session with Beamz: “Playing the Beamz took the song that I wrote to a whole new level because I was able to add instruments that I would not normally be able to play; I play the bass. On this song for my homie who saved my life, I can now play a bunch of other instruments like electric guitar and scratch like a DJ, which is awesome since this is a hop-hop song!”

Final session with Beamz: “I figured out all the instruments on this track called, “That’s A Rap”- which is an awesome name by the way, and I get to play them in the intro while I am speaking before the beat kicks in, and also in the breaks, which adds a nice sound to the song. I pretty much was able to control where I wanted all the sounds so now, it sounds perfect.”

Cognitive Protocol: Individual

Music Therapist/Educator Feedback: “This session is designed to get increasingly more complex and demanding- cognitively and physically- as is progresses. It certainly carries this ideal over in the application process, where it can get frustrating for the client at times; however, clients sustain motivation with appropriate re-direction and constant aural reinforcement from the Beamz unit and the music that the clients are able produce using the Beamz instrument.”
~Rebecca Vaudreuil, EdM, MT-BC

Client Feedback: “It was a bit difficult to create the drum beat, even from the first moment of laying down the bass [kick] drum, but once I got in the flow, it actually got easier and it was cool to watch it all come together by layering it in GarageBand. I made a drum beat even though I never even played a drum kit.”
I. Abstract:

This cognitive protocol is designed for music therapists to facilitate cognition exercises using the Beamz Interactive Music System in a group setting. This protocol aims to initiate and sustain focused attention and engage the players in cognitive exercises that encourage memory activation, sequence recall, and tools to facilitate musical mnemonics based on neurologic music therapy (NMT) interventions including: Auditory Perception Training, Music Attention Control Training, and Music Executive Function Training.

This protocol includes three parts:
   a) Foundational (warm-up) Exercises: “Say, Play & Repeat Patterned Exercise”
   b) Intermediate Level: “Reflect, Repeat, & Expand: Both Sides Now”
   c) Expert Performance: “Making the Band”

*Note: In order to reach the next level of the protocol, the player must complete the objectives of each level, which are stipulated in each section; therefore this protocol can be used as an assessment tool in addition to other suggested cognitive measurement tools.

II. Protocol Logistics:

**Goals:** Cognitive stimulation, memory recall, music attention control training (selected, divided, alternating), group entrainment

**Suggested Measurement Tools:** Evaluation tools are included in the protocol. In addition, PHQ-8, quality of life, or memory/attention questionnaires can be used.

**Type of Session:** Group (3-6 participants)

**Duration:** 60 minutes to complete: 15 minutes Foundational Exercises; 25 minutes Intermediate Level; 15 minutes Expert Performance; 5 minutes pre/post-testing or 50 minutes (including 10 minutes pre/post-testing) to complete each section, facilitating each section over three or more sessions.

**Session Materials:** Beamz Interactive Music Unit, accompanying technology (computer/iPad Generation 3 or later/iPhone 4S or later), auxiliary chord, speaker or amplifier.

**Session Playlist:** As specified in “Technology Tips” Section in the Introduction to this resource, use the “Add Playlist” function to create a playlist for this protocol including: “Bluegrass Song” (bluegrass), “Classique” (classical), “Frenetix” (electronica), “Honky Tonk Hoedown” (country/blues), “Jazz Club” (jazz), and “Rock Star” (rock).
III. NMT Referenced Interventions:

**Auditory Perception Training (APT)**
Focuses on auditory perception and sensory integration. It is composed of musical exercises that help to identify and discriminate between different components of sound, such as time, tempo, duration, pitch, rhythmic patterns, and speech. APT integrates different sensory modalities (visual, tactile, kinesthetic) during active musical exercises. The area of cognition training includes both auditory perception and sensory integration. *(Thaut, NMT Handbook, 2014, p227)*

**Musical Attention Control Training (MACT)**
Structured active or receptive musical exercises involving pre-composed performance or improvisation, in which musical elements cue different musical responses to practice attention functions- selective, divided, and alternating. *(Thaut, Rhythm, Music, and the Brain, 2005, p196)*

**Musical Executive Function Training (MEFT)**
Executive Function (EF) is the pinnacle of the brain’s many impressive skills. Centered in the prefrontal area and extending into complex networks throughout the brain, EF facilitates the ability to:

- create new aspirations
- set goals
- make plans to accomplish goals
- become motivated to act
- organize efforts
- inhibit behaviors that are not compatible with goals
- initiate and execute plans
- monitor outcomes of efforts
- make adjustments to guide plans to completion

*(Thaut, NMT Handbook, 2014, p279)*

MEFT includes “improvisation and composition exercises in group or individually to practice EF skills such as organization, problem solving, decision making, reasoning, and comprehension” *(Thaut, 2005, p197)*. MEFT is the use of improvisation or composed music to practice these EF skills within a context that provides therapeutic elements such as: real-time performance, temporal structure, creativity, and socialization. *(Dolan, 2002; Damasio, 1995; Bechara et. al., 2000)*
NMT Clinical Recommendations:
We strongly advise that the facilitating music therapist consider the following when selecting the NMT technique on which to focus the clinical protocol:

1. Focus on only one NMT technique based on applicable non-music client objective. This can remain constant for each level of the progressive protocols or change between levels; however remember that if goals change between sections, therapist must change the intervention as stipulated by goal.

2. Once music therapist has determined the client’s non-musical objective, select the single applicable NMT technique for that one objective.

3. The advantage of the protocols is that music therapists can change their application based on the objectives, which are flexible and adaptable to meet the needs of various clients in multiple neurologic settings.

4. Refer to the Transformational Design Model (TDM) in the Handbook of NMT (Thaut, NMT Handbook, 2014, p62) for a comprehensive description of the essential NMT process from assessment to application to completion.
IV. Cognitive Intervention

A. **Foundational Exercises: “Say, Play & Repeat Patterned Exercise” (15 or 50 min.)**

*Note: Objectives are stated in procedural steps; applicable interventions are italicized in brackets following instructions.

**Procedure:**

i. To facilitate check-in, introduce the session and explain the goals and expectations of the participants. This may be incorporated into an existing therapeutic check-in method (i.e. Participant names and stress levels 1-10; feeling word; etc…).

ii. Demonstrate how to use the Beamz unit by presenting two genre options for this exercise out of the following appropriate samples: “Bluegrass Song” (bluegrass), “Classique” (classical), “Frenetix” (electronica), “Honky Tonk Hoedown” (country/blues), “Jazz Club” (jazz), and “Rock Star” (rock). Samples are recommended due to the diversity of genres as well as the instrumental/vocal variety in each rotation of the three instruments fields. “Honky Tonk Hoedown” and “Jazz Club” have four percussion options in the third field; however participants with cognitive impairments may have varied capabilities of distinguishing between the distinct sounds. The group votes on one genre for the foundational exercises. ([MEFT, self-awareness, preference identification])

iii. Direct the players in repeating sequenced patterns of instruments on the Beamz, starting with using dominant hand only. Instruct the players to remember the pattern the best that they can, and even if it gets difficult, encourage them to play what they can recall. ([Active listening, instruction comprehension])

iv. Using the visual cue of the technological device that runs the Beamz app, begin by identifying and playing each individual beam (no rhythm track) in the first field of instruments for the players one time with dominant hand. Players repeat by saying and playing the instrument name for reinforcement. ([APT visual/auditory association formation], MACT)

v. If the players complete iii, model a three-note sequence incorporating more than one beam. If the players repeat this correctly, model a four-note sequence using at least three beams. If the players repeat this successfully, play a five-note sequence using all four beams. ([Working memory, cognitive recall of specific sequences, inhibitory control])

vi. If the players achieve the five-note pattern at the end of iv, introduce the rhythm track and instruct the players to ‘say and play’ each instrument as it creates sound over the backing track. ([APT, MACT])

vii. If using as a stand-alone session, facilitate check-out, gathering player feedback on using the Beamz. (i.e. What they enjoyed…what was easy?…what was challenging?) This may be incorporated into an existing therapeutic check-out method. For a progressive session, move on to Part B or check out and prepare group for Part B at a following session.

**Evaluation:** Track each client’s results from the steps including: a) numeric accuracy (if they played the right number of notes, b) instrument accuracy (if they played the right instrument, and c) if this occurred simultaneously. See Appendix A for evaluation tool #1. If appropriate, incorporate peer support; group members assist in the teaching of the first field of instruments. ([Cognitive reinforcement])
B. Intermediate Level: “Reflect, Repeat, & Expand: Both Sides Now” (25 or 50 min.)

* Note: Move onto Part B only if Part A (Foundational Exercises) was completed accurately. If one or more of the players did not complete, spend more time on step ii below. If any portion of this protocol is longer than stipulated in the logistics section, the session can be extended to two or more sessions. This provides the ability to track players’ cognitive capacity for recall over time.

Procedure:

i. If starting this as a continued session at a different time, check-in by reflecting on Part A, introduce the session and explain the goals and expectations of participants. This may be incorporated into an existing therapeutic check-in method (i.e. Participant names and stress levels 1-10; feeling word; etc…).

ii. Demonstrate to the group how to switch the field of instruments (largest button with arrows in the middle of unit) and explain that there are four instruments in each field and a total of three fields.

iii.

iv.

v.

vi.

vii.

Evaluation: If all group members are able to recall 4/4 from field of instrument 1, 3/4 from field of instrument 2, and 2/4 from field of instrument 3, they can move on to the next phase. See Appendix A for evaluation tool #2. If applicable, identify and document which instruments are not being retained to cross-reference at a later time with timbre, pitch, and other dynamics of client preferred music. [Echoic memory through auditory processing, short-term memory recall]
C. **Expert Performance: “Setting the Stage & Playing the Light” (15 or 50 min.)**

*Note: Move onto Part C only if Part B (Intermediate Level) was completed.*

**Procedure:**

i. If starting this as a continued session at a different time, check-in by reflecting on Part B, introduce the session, and explain the goals and expectations of participants. This may be incorporated into an existing therapeutic check-in method (i.e. Participant names and stress levels 1-10; feeling word; etc…).

ii. Instruct that each player has almost earned the chance to solo, but first, facilitate a quick exercise to ensure that everyone is ready to take the stage! Go around the room and instruct each member to play beams from each field of instruments. Guide players in identifying instruments and changing the fields autonomously. Provide aural reinforcement as needed. ([Working memory, cognitive recall through auditory perception-APT])

iii.

iv.

v.

vi.

vii.
Appendix A: Evaluation Tools

A. Foundational Exercises: “Say, Play & Repeat Patterned Exercise”

Evaluation Tool #1 (for use with A and B ii)

<table>
<thead>
<tr>
<th>Numeric Accuracy</th>
<th>Instrument Accuracy</th>
<th>Simultaneous Accuracy (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>___/3</td>
<td>___/2</td>
<td>Sequence 1: ___</td>
</tr>
<tr>
<td>___/4</td>
<td>___/3</td>
<td>Sequence 2: ___</td>
</tr>
<tr>
<td>___/5</td>
<td>___/4</td>
<td>Sequence 3: ___</td>
</tr>
</tbody>
</table>

Evaluation Tool #1 Key: Numeric accuracy: The number of times the player plays the right number of times in the modeled sequence; Instrument accuracy: The number of times player plays the correct instrument in the modeled sequence; Simultaneous Accuracy: The number of times that numeric and instrument accuracy occurs at the same time.

Notes/Observations:
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

B. Intermediate Level: “Reflect, Repeat, & Expand: Both Sides Now”

Evaluation Tool #1 (for use with B)

<table>
<thead>
<tr>
<th>Field of Instrument 1</th>
<th>Field of Instrument 2</th>
<th>Field of Instrument 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline: 4/4</td>
<td>Baseline: 3/4</td>
<td>Baseline: 2/4</td>
</tr>
<tr>
<td>Achieved: ___/4</td>
<td>Achieved: ___/4</td>
<td>Achieved: ___/4</td>
</tr>
</tbody>
</table>

Evaluation Tool #2 Key: Document which instruments are not being retained to cross-reference at a later time with timbre, pitch, and other dynamics of client preferred music.

Notes/Observations:
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
C. Expert Performance: “Setting the Stage & Playing the Light”

Evaluation Tool #1 (for use with C iii)

<table>
<thead>
<tr>
<th>Player Outcomes</th>
<th>Field of Instrument 1</th>
<th>Field of Instrument 2</th>
<th>Field of Instrument 3</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Instruments correct</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td># of Instruments incorrect</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td># of Instruments not played/missed</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
</tbody>
</table>

Evaluation Tool #3 Key: Document how many instruments were: executed correctly, executed incorrectly, not played/missed.

Notes/Observations:_________________________________________________________
________________________________________________________________________
________________________________________________________________________

Appendix B: Protocol Modifications

1. Even though this protocol is designed for a group, it may be facilitated in an individual setting as well.
2. This protocol can be executed over the course of three sessions, since each part of it has an internal evaluation tool and begins with reflecting on previously acquired skills.
3. Depending on time considerations, this can accommodate a larger group of at least 90-minute duration.
4. For a longer group or individual session, extend the final phase to allow for more free play.
5. Depending on neurologic functioning level of clients, music therapist can adapt the foundational exercises to offer more than one genre, but do not follow up with the following parts of the protocol- use it exclusively.
6. Make this a game format in groups. Run protocol with 1:1 (small group) or 2+ teams (larger group).
I. Abstract:

This sensorimotor protocol is designed for music therapists to facilitate sensorimotor exercises using the Beamz Interactive Music System in a group setting. This protocol aims to initiate motor movement, promote group cohesion through synchronized movement activities, encourage leadership through participant facilitation, and promote spatial awareness of participants relative to their physicality and surroundings. This protocol is based on neurologic music therapy (NMT) interventions including: Pattered Sensory Enhancement, Therapeutic Instrumental Music Performance, and Auditory Perception Training.

This protocol includes three parts:
   a) Foundational (warm-up) Exercises: “Getting Warmed-Up”
   b) Intermediate Level: “You’re a Mover & a Shaker!”
   c) Expert Performance: “Body Percussion and More!”

*Note: In order to reach the next level of the protocol, the player must complete the objectives of each level, which are stipulated in each section; therefore this protocol can be used as an assessment tool in addition to other suggested cognitive measurement tools.

II. Protocol Logistics:

**Goals:** Initiate sensorimotor movement, increase physical and spatial awareness, promote mind/body connection, facilitate group entrainment

**Suggested Measurement Tools:** Evaluation tools are included in the protocol. In addition, simple pre/post muscle testing and motor questionnaires can be used.

**Type of Session:** Group (3-6 participants)

**Duration:** 60 minutes to complete: 15 minutes Foundational Exercises; 20 minutes Intermediate Level; 15 minutes Expert Performance; 10 minutes pre/post-testing or 50 minutes (including 10 minutes pre/post-testing) to complete each section, facilitating each section over three or more sessions.

**Session Materials:** Beamz Interactive Music Unit, accompanying technology (computer/iPad Generation 3 or later/iPhone 4S or later), auxiliary chord, speaker or amplifier, yoga mats, egg shakers, paddle drums

**Session Playlist:** As specified in “Technology Tips” Section in the Introduction to this resource, use the “Add Playlist” function to create a playlist for this protocol including: “Brass Knuckles” (jazz), “Classique” (classical), and “Moonlight Redux” (classical pop).

**Other Considerations:** Instruct participants before the session to wear loose and unrestrictive clothing so they have maximum range of motion and mobility.
III. NMT Referenced Interventions:

**Patterned Sensory Enhancement (PSE)**
A technique that uses rhythmic, melodic, harmonic and dynamic-acoustical elements of music to provide temporal, spatial, and force cues for movements which reflect functional movements of activities of daily living. PSE applies to movements that are not rhythmical by nature (i.e. most arm/hand movements, functional movement sequences). PSE uses temporal, spatial, and dynamic musical patterns to assemble single, discrete motions into functional movement patterns and sequences. PSE is used to increase physical strength and endurance, improve balance and posture, and increase functional motor skills of the upper limbs. When doing a sequence PSE exercise, it is important that there is a consistent underlying timing structure which us cueing the movement. *(Thaut, NMT Handbook, 2014, p106)*

**Therapeutic Instrumental Music Performance (TIMP)**
One of the three NMT techniques that addresses motor rehabilitation. TIMP facilitates the playing of musical instruments to exercise and stimulate impaired motor patterns and regain functional patterns of movement. The choice of musical instruments, spatial configurations, and therapeutically designed patterns of playing help facilitate the re (training) of functional movement skills. TIMP is also useful for helping clients overcome unhealthy compensation strategies while increasing strength, endurance, and motor control. The use of TIMP can help the therapist and client address appropriate ranges of motion, limb coordination, finger dexterity and grasp, flexion/extension, adduction/abduction, rotation, and supination/pronation, among other goals. *(Thaut, NMT Handbook, 2014, p116)*

**Auditory Perception Training (APT)**
Focuses on auditory perception and sensory integration. It is composed of musical exercises that help to identify and discriminate between different components of sound, such as time, tempo, duration, pitch, rhythmic patterns, and speech. APT integrates different sensory modalities (visual, tactile, kinesthetic) during active musical exercises. The area of cognition training includes both auditory perception and sensory integration. *(Thaut, NMT Handbook, 2014, p227)*
B. Intermediate Level: “You’re a Mover & a Shaker!” (20 or 50 min.)

* Note: Move onto Part B only if Part A (Foundational Exercises) was appropriately executed, as there is increased motor demand for Part B.

Procedure:

i. If starting this as a continued session at a different time, check-in by reflecting on Part A, introduce the session and explain the goals and expectations of participants. This may be incorporated into an existing therapeutic check-in method (i.e. Participant names and stress levels 1-10; feeling word; etc…).

ii. Introduce the track, “Brass Knuckles.” The first field of instruments is dynamic including slide guitar, trumpet, brass section, and drums. Model how each instrument is physically played in performance. Slide guitar movement supports upper extremity bilateral abduction; trumpet and brass section movements supports bilateral coordination and trunk movement, and drum playing movement supports upper (snare, toms) and lower (kick drum) extremity coordination and crossing midline (hi hat). [TIMP, intentional movement, muscle isolations]

iii. Distribute two shakers, maracas, or a like instrument to each group members (one for each hand, if applicable). Egg shakers are suggested because the contour of this instrument fits well in palms of hands. Introduce the rhythm track to “Brass Knuckles” and model playing the shakers along to the rhythm. Model first playing the quarter note along to the tempo (~100 BPM) and adding subdivisions as the rhythm progresses. [TIMP, gross motor movement, physical rhythmic entrainment]

iv. The “Brass Knuckles” track plays with a beat from :01- 0:45 seconds. Instruct the group that they will follow the beat and rhythm of the track and all play as a group in rhythm using their shakers (no beams). [TIMP, group entrainment to rhythm, flexion/extension of arms, gross motor]

v. 

vi. 

vii. 

Evaluation: Note group members’ ability to play rhythmically using intentional movement and note their ranges of motion. See Appendix A for evaluation tool #2.
Appendix A: Evaluation Tools

A. Foundational Exercises: “Getting Warmed-Up”

Evaluation Tool #1 (for use with A)

<table>
<thead>
<tr>
<th>Motor Ability</th>
<th>Motor Restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper:</td>
<td>Upper:</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>Lower:</td>
<td>Lower:</td>
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</tbody>
</table>

Response to Music- Verbal and Motor

<table>
<thead>
<tr>
<th>Motor</th>
<th>Observed Leadership Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>Verbal</td>
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</tbody>
</table>

Notes/Observations:

B. Intermediate Level: “You’re a Mover & a Shaker!”

Evaluation Tool #2 (for use with B)

<table>
<thead>
<tr>
<th>Playing 1/4 notes (100 BPM)</th>
<th>Playing 1/8 notes (100 BPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td># shakes / measures</td>
<td># shakes / measures</td>
</tr>
<tr>
<td>ROM Observations</td>
<td>ROM Observations</td>
</tr>
<tr>
<td>Amount of time to entrain</td>
<td>Amount of time to re-entrain</td>
</tr>
<tr>
<td>(pre-solo / improvisation)</td>
<td>(post-solo / improvisation)</td>
</tr>
<tr>
<td>Pre-solo:</td>
<td>Post-solo:</td>
</tr>
<tr>
<td>Pre-improvisation:</td>
<td>Post-improvisation:</td>
</tr>
<tr>
<td>Time to entrain / segment time = %</td>
<td>Time to entrain / segment time = %</td>
</tr>
</tbody>
</table>

Evaluation Tool #2 Key: Note group members’ ability to play rhythmically using intentional movement and note their observed ranges of motion (ROM).

Notes/Observations:
I. Abstract:

This health and wellness protocol is designed for music therapists to facilitate deep breathing, autogenic relaxation, and imagery exercises using the Beamz Interactive Music System in a group or individual setting. This protocol aims to teach stress-reduction strategies and engage the participant in utilizing various forms of relaxation through psychoeducation.

*Note: Objectives are stated in each step of the procedure; therefore, this protocol can be used as an assessment and measurement tool in addition to other suggested evaluations, and measurement tool in addition to other suggested evaluations.

II. Protocol Logistics:

Goals: Gain understanding of the effects of stress on the mind and body; Attain mental clarity, Identify somatic/kinesthetic relaxation responses, Learn tools to incorporate relaxation to daily schedule.

Suggested Measurement Tools: Pain/Anxiety/Depression Scales

Type of Session: Individual or Group (up to 8 participants)

Duration: 50 minute clinical session; 10 minutes pre/post-testing.

Session Materials: Beamz Interactive Music Unit, accompanying technology (computer/iPad Generation 3 or later/iPhone 4S or later), auxiliary chord, speaker or amplifier, rain stick, ocean drum, thunder tube, Native American flute, any instruments that produce (nature) sounds that can provide tension and release.

Session Playlist: As specified in “Technology Tips” Section in the Introduction to this resource, use the “Add Playlist” function to create a playlist for this protocol including: “Beamz Suite,” “Jazz Club,” “Moonlight Redux,” and Classique.” Other songs from the Beamz Master Playlist can also be used in this protocol, depending on client preference such as “Gathering of the Tribes” and “Sanctuary.”

III. Research on Music and Relaxation Effects


Music can be used to induce relaxation responses. This corresponds to the musical concepts of tension and resolution in music. Snyder explains this as complexities of metrical tension such as syncopation, tuplets (triplets), and polyrhythms related to temporal changes in music such as changes in time intervals. For example, faster parts of the rhythm are ‘higher’ parts of a rhythmic contour, which generates tension and the slower parts of the rhythm are ‘lower’ parts of the contour, which release the tension. This concept can also be applied to the positioning of chords in a musical sequence to create harmonic tension. For example, the relationships between the dominant, subdominant, and tonic chords in music, in which the subdominant and dominant chords create a harmonic tension that resolves to the tonic chord (Snyder, 2000).
Applied clinically, for example, in the facilitation of an autogenic or progressive muscle relaxation, a music therapist may guide the client to create physical tension by tightening parts of their bodies while sustaining the dominant chord and then releasing and relaxing the targeted muscles as the music resolves to the tonic. In working with people who have been exposed to trauma, for example, with veterans who have possibly experienced high levels of traumatic events in theatre, autogenic relaxations are recommended. It is not advised to facilitate imagery exercises unless a clinician has a comprehensive understanding of the clients, higher levels of expertise in trauma processing, or increased experience with and understating of combat trauma (Vaudreuil).

IV. Health & Wellness Intervention

Procedure:

i. To facilitate check-in, introduce the session and explain the goals and expectations of the participants. This may be incorporated into an existing therapeutic check-in method. Ask participants to state pain/anxiety/depression levels on a Likert Scale from 1-10, where 1 = no pain/anxiety/depression and 10 = the highest level of pain/anxiety/depression. See Appendix A for template to chart levels.

ii. Ask participants to define relaxation and stress as it pertains to their lives and affects them physically and psychologically. Stress can be positive and negative—everyone experiences stress to some extent; however, how people deal with stress and the tools they use to manage stress influences their ability to achieve relaxation. Additionally, being informed about the effects of stress and how regulate it determines the extent of relaxation that can be achieved. Ask participants for a subjective account of how they deal with stress.

iii.

iv.

v.
Explain the following steps for incorporating autogenic relaxation:

**Baseline** = Sitting in resting position with only the backing track from “Beamz Suite” playing. Taking deep breaths in and out…in and out.

**Step 1:** With steady breath and steady hands, approach the beam of choice with open hand.

**Step 2:** As soon as the hand breaks the beam and activates sound, make a clenched fist and hold it, acknowledging and feeling the tension.

**Step 3:** When tension is acknowledged and ready to be let go, release the fist while simultaneously moving the hand back slowly to baseline while saying quietly or to oneself, “release and let go.”

**Step 4:** Take a few deep breath cycles and begin again. Repeat this cycle as long as it takes to feel no tension in the hands, wrists, elbows, and arms.

vi. Process the experience of the autogenic relaxation. Was the body and mind in-line? Were the body’s physiological responses able to influence psychological/emotional states? Was mental tension released?...Physical tension?

vii.

viii.

ix.
Appendix A: Evaluation Tools

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>Pre-Pain</th>
<th>Post-Pain</th>
<th>Pre-Anxiety</th>
<th>Post-Anxiety</th>
<th>Pre-Depression</th>
<th>Post-Depression</th>
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<tbody>
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</table>

Appendix B: Protocol Modifications

1. This protocol can be facilitated in an individual or group setting.
2. Depending on time considerations, this can be facilitated in a larger group (up to 10 participants) with at least 90-minute group duration.
3. Other Beamz tracks applicable to this session are: “Jazz Club,” “Moonlight Redux,” “Beamz Suite,” “Classique,” “Gathering of the Tribes,” and “Sanctuary.”
4. The autogenic relaxation can incorporate other parts of the body other than hands and arms.
5. For a longer group or individual session, extend the final phase to allow the teaching of more relaxation tools.
Appendix C: Completion Certificate

Visit [Link] to download a color version of the completion certificate template file for this protocol.