INTERPERSONAL RHYTHMS DISRUPTED BY A HISTORY OF TRAUMA: AN IN-DEPTH CASE STUDY OF ANALYTICAL MUSIC THERAPY

by

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Abstract

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by

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This dissertation project is a phenomenological study of interpersonal rhythms within the music therapy treatment of a client with a history of cumulative trauma. An attempt was made to explore whether and how rhythmic interactions within musical improvisations facilitate the repair of ruptures in such rhythms. Towards this aim, the rhythmic interactions between the two participants were analyzed to find evidence for bi-directional rhythmic co-regulation and loose mid-range coordination. Furthermore, this study tracked shifts in the client's mental state by applying a moment-to-moment analysis of the music with four Improvisation Assessment Profiles (IAPs).

It was found that musical improvisation allows for ample opportunities for bi-directional co-regulation and loose mid-range coordination. Most of the mental state ratings were within the "optimal arousal state," suggesting that music does, in fact, facilitate regulation on both intrapsychic and interpersonal levels. However, this study also uncovered the importance of spontaneous and planned disruptions in rhythmic interaction, which find their musical expression in syncopations, polyrhythms, and a-rhythmic sections. These experiences are deeply embedded in the body. Thus, they provide the opportunity not only for reconnecting with one's own rhythms, and for reconstructing a disrupted expectation system within an improvisation, but also

for finding agency in the playful thwarting of expectations, and for exploring the continuum of separation and connectedness in a musical relationship. In this sense, music acts as a transitional phenomenon, creating an intermediate space between inner and outer worlds. In this "third" area of experiencing, both participants align with patterns that go beyond the sum of their contributions; when this state of flow is reached, one can feel that one is played by the music as much as one is playing it.

The results of this study indicate that a close rhythmic analysis of improvised interactions can help music therapists to assess the client's level of trauma as well as to tailor interventions to move them out of the repetitious rhythms of hyper- and hypoarousal. For verbal psychotherapists and psychoanalysts, the implication is that rhythmically aware, embodied listening can open up new dimensions of transference and countertransference phenomena. To this end, clinicians should pay special attention to rhythmic shifts in affect, speech, and bodily gestures.

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Chapter I: Introduction

As the lights are dimmed, the conversation begins to die down. A clink of ice in a glass, a rustle of fabric as my friend next to me shifts in her seat. The jazz musicians enter, weaving their way through the expectant audience. Applause erupts, the electricity builds. The musicians arrive at their stations. The bassist picks up his magnificent instrument, the drummer half-disappears behind his set, the pianist moves towards the keyboard, turning both inward to tap into his unique well of creativity and outward, ready to communicate with the other musicians on stage. The tenor saxophone player takes the guard off his mouthpiece and wets the reed for the umpteenth time. In the moment of silence before the music starts, I catch myself holding my breath. My whole body feels taut in anticipation of what is to come. And as the first notes fill the room, I begin to relax into a space of receptivity and readiness to engage with the sights, sounds, emotions, and images that make me a part of the conversation between the musicians.

The act of making music is an act of intersubjectivity. Music is the most narrative of the art forms, and thus evokes human experience. This experience is deeply embedded in the body. Music leads to the impulse to move, to tap your feet to the beat, to sway from side to side, to dance cheek to cheek. It integrates right and left hemispheric brain functions, and stimulates the sympathetic nervous system. Music also has the ability to tap so-called procedural memories that have been stored in an implicit, multi-sensory form and that have been dissociated, sealed off from conscious experience. It can access emotions in a very direct way, and in its' unfolding over time takes us on a journey through different emotional states.

This study evolved as an integration of my training in music therapy, specifically Analytical Music Therapy, in psychodynamic clinical psychology and in jazz improvisation as a tenor saxophone player. It is fueled by my deep passion for music, by my belief in the healing potential of the arts, and by a fascination with how the body is involved in therapy. The aim of this project is to explore the development of musical interaction on a rhythmic level within the context of an Analytical Music Therapy treatment of a patient with a history of cumulative trauma. Of particular interest is whether patterns of interpersonal rhythmic exchanges emerge within the co-construction of musical improvisations, whether they are related to an improved ability in self- and interactive regulation, and how they contribute to the "meaning of what happens."

Rhythm was chosen as the focus because it is one of the most fundamental aspects of music and is arguably most closely related to bodily experience. As we breathe in and out, as our hearts beat, as we sleep and wake, we are enveloped by and participate in rhythm. Rhythm is present in both music and speech. I will argue that an increased sensitivity to rhythm in both realms can teach us how to listen to some of the 'unsayable' aspects of trauma, and to what lies beyond the grasp and specificity of words.

This study has a two-fold aim: first, I hope to contribute to the emerging literature on the use of music therapy in treating patients with cumulative trauma by integrating concepts from the field of infant research, neuroscience, psychoanalysis, music therapy, music psychology and trauma. Second, I wish to explore the space that exists between words and traumatic experience with a musical ear, listening to the rhythms of relational

bodies in motion. As listening is central in psychoanalysis, we attempt to be open to new ways of listening to what our patients are trying to tell us in manifold ways.

What is music therapy, and how does it work?

Although the recognition of the therapeutic effects of music goes back to antiquity, music therapy as a profession has its roots in the treatment of traumatized war veterans after the first two World Wars. Both professional and amateur musicians were asked to play for hospitalized veterans suffering from physical and emotional trauma. As it became apparent that the veterans responded to music, hospitals began to hire musicians. Given the complexity involved in treating these individuals, it soon became clear that the hospital musicians needed specialized training in order to better serve their clients. This resulted in training programs developing throughout the United States.

Since there are many different ways in which music therapy is practiced, there are many different definitions of what it entails. “Music therapy is a systematic process of intervention wherein the therapist helps the client to achieve health, using musical experiences and relationships that develop through them as dynamic forces of change” (Bruscia, 1995, p. 17). The American Music Therapy Association defines music therapy as “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” (American Music Therapy Association definition, 2005). Both of these definitions highlight the clinical nature of the use of music within the therapeutic relationship.

A basic element of both jazz performance and music therapy is the act of improvisation, the "immediate activity of inventing and performing music" (Aldridge & Aldridge (2008), p 42). Whereas the aesthetic experience and high technical proficiency is in the foreground during improvisation in jazz, no previous formal knowledge of music is required in order to improvise in a music therapy session. The goal is not primarily to create music that is "beautiful," but rather to open oneself to authentic expression in the present moment. The client is invited to "sound" her internal state, using instruments that require no previous skill. This expression manifests a certain musical form, which includes the dimensions of time and intensity, and represents a unique and individual pattern of expression. In their co-construction of an improvisation, both patient and therapist have access to a musical palette that ranges from the choice of instruments and the way to play them, to the intrinsic elements of music, such as timbre, tempo, rhythm, choice of scales and modes, dynamics, and the use of silence, to name a few.

For some music therapists, the music experience in and of itself is the mutative force. Many therapists in this group also believe that one should not apply theories from other disciplines (such as psychology) to explain music therapeutic process. For others, verbal processing of musical experiences is a necessary factor that goes hand in hand with the therapeutic power of the musical experience. Therapists in this group often integrate psychological theories to aid their understanding of clinical material.

The music therapist assesses the patient's patterns of communication and relatedness in the patient's spontaneous musical utterances, and adapts her interventions based on what she hears and on her clinical framework. "These clinical interventions, which are explicitly musical, enable both therapist and client to gauge the possibilities

and limitations of human relating, and to address and, in some cases, repair these" (Pavlicevic, 2007, p.175). This potential for repair of disruptions in relatedness through musical improvisation is at the core of the proposed study.

Psychodynamic approaches to music therapy

From a psychodynamic perspective, the therapeutic power of music in a clinical situation stems from its ability to express experiences in symbolic/metaphoric ways through musical improvisation involving both therapist and client. The music therapist is usually an integral part in the creation and communication of these symbolic representations, empathically resonating with them and participating in the decoding of their possible meanings.

I was trained in a particular type of psychodynamic music therapy approach called Analytic Music Therapy (AMT). "Analytical Music Therapy is the name that has prevailed for the analytically-informed symbolic use of improvised music by the music therapist and client. It is a creative tool with which to explore the client's inner life so as to provide the way forward for growth and greater self- knowledge" (Priestley, 1994, p.3). AMT is analytically informed in two ways: first, it draws upon analytic theory, especially on the work of Freud and Klein, and second, it involves an in-depth analysis of the musical improvisations, which are recorded. The musical improvisations are usually based on feelings, images, fantasies, dreams, memories and events that are identified as themes for exploration. At times, a title will be decided upon to focus the improvisation. In these cases, the improvisations take on a referential nature, meaning that the music symbolizes something outside of itself. Verbal processing is an integral part of this

method, and often leads to a more specific musical experience by agreeing on a particular focus.

The constructs of the study

Three main constructs will be examined and operationalized using the data of the case study. The three constructs are: 1. From the trauma literature, the concept of the "optimal arousal zone" and "window of tolerance," as described by Siegel (1999), and Ogden et al. (2006), 2. from infant research, the bi-directional rhythmic coordination in a dyad, with an exploration of the idea of "optimal midrange coordination" (Jaffe (2001), Beebe et al. (2005)), and 3. from psychoanalysis, Winnicott's concept of transitional phenomena. This third construct will serve as a frame for the discussion of the results.

Both the concepts of the window of tolerance as well as the optimal midrange coordination idea concerns mutual coregulation. Both concepts are not static, but rather fluid, and change over time. They also involve the ability to relate to another person, and the capacity to integrate different aspects of experience. It is hypothesized that in music therapy, too, there is an optimal midrange in coordination within a musical interaction. If the therapist attempts to follow the patient's musical utterances too closely, or vice versa, there is little room for flexibility and spontaneity. If both partners are too tenuously connected, there is no way to feel "together" in the music, and to "feel felt" by the other. However, just as in verbal psychotherapy, it may be inevitable, necessary, and useful to go through periods of disconnection, of rupture, in order to enable repair.

Applying the three constructs to the Analytical Music Therapy case allows for an in-depth investigation of how self- and other-regulative processes work in the context of

improvised rhythmical/musical interaction. Music offers a particular type of bi-directional coordination of rhythms, in that it is common in a joint improvisation that both musical partners "speak" at the same time. In verbal dialogue, Jaffe (2001) termed this "coaction," taking the form of either interruptive or non-interruptive simultaneous speech" (p.28). The optimal midrange coordination idea shows how the (rhythmic) interaction of both partners leads to mutual co-regulation.

Concerning the construct of window of tolerance, I hope to explore how music impacts the client's states of internal arousal. I am especially interested in what happens at the edges of the different zones – on the threshold between the window of tolerance and hyperarousal zone as well as on the border to the hypoarousal zone. Is there evidence that music helps the client and the therapist/client dyad to transition from a hyper- or hypoaroused state to the "optimal arousal zone?" Further, is there a correlation between psychological shifts during the verbal part of the session and the patterns of rhythmic interaction in the musical improvisation? Is there evidence of bi-directional rhythmic coordination in the music? If so, how does each individual's rhythmic behavior affect that of his or her partner? Translating these investigative approaches into the realm of psychoanalysis, can music be conceptualized as a transitional phenomenon in Winnicott's sense? These are some of the questions that will guide the investigation.

Chapter II: Review of the Literature

A brief overview of trauma

In recent years, research in the field of trauma has greatly expanded our understanding of how traumatic experience affects the individual affectively, somatically, developmentally, psychologically, socially, and on the level of interpersonal relationships. One of the difficulties in working with traumatized populations is that the traumatic experience is often not verbally accessible. Especially in the case of preverbal trauma, the event is stored in implicit, multi-sensory ways. Even in adulthood, however, the overwhelming nature of trauma can lead to a decoupling of explicit and implicit memory systems, leading to what has been called 'fragmented memories.' In this case, verbally mediated episodic memory is not available to help regulate implicit emotional experiences, which can lead to intrusive, fearful memories and associations to the trauma. These memories can seem isolated from the context in which they are experienced, and the intensity of the reaction can also seem like an extreme response to a minor "trigger."

Evidence from clinical encounters and research has shown that not only discrete and overwhelming events can cause traumatic reactions, but that exposure to repeated interpersonal stressors such as interpersonal violence can also lead to symptoms of trauma. The DSM IV Field Trial conducted between 1990 and 1992 sought to explore whether victims of interpersonal violence were more adequately captured by a diagnosis other than PTSD, because their symptoms were different. As a result, Herman (1992) coined the diagnosis 'disorders of extreme stress not otherwise specified' (DESNOS). DESNOS attempts to capture complicated adaptations to traumatic experiences that are

often severe and prolonged. Research has shown that this diagnosis is also more suited to the symptoms that arise in victims of child abuse, concentration camps, and of domestic violence. Since women are much more likely to be traumatized in the context of intimate relationships than men, and since the symptoms of children are often not adequately captured by the diagnosis of PTSD, the DESNOS diagnosis can be extremely useful in working with these populations.

This symptom configuration is also called complex psychological trauma. Courtois and Ford (2009) define complex psychological trauma as "involving traumatic stressors that (1) are repetitive and prolonged; (2) involve direct harm and/or neglect and abandonment by caregivers or ostensibly responsible adults; (3) occur at developmentally vulnerable times in the victim's life; and (4) have great potential to compromise severely a child's development" (p.1).

In a similar vein, trauma researcher Bessel van der Kolk and his colleagues at the Trauma Center of the Justice Resource Institute have developed the diagnosis of Developmental Trauma Disorder (DTD). This group of researchers is extremely committed to their goal of having this diagnosis included in the next incarnation of the Diagnostic Statistical Manual (DSM V). They believe that children and adolescents who are exposed to ongoing maltreatment, inadequate care, and ongoing traumatic experiences often remain undiagnosed, misdiagnosed, and are offered inadequate treatment because the current diagnostic system does not contain a diagnosis that captures their clinical symptoms. These symptoms differ in significant ways to those of adult-onset PTSD, and are often misdiagnosed as Bipolar Disorder or ADHD. Although the DTD diagnosis is still evolving, it includes the criterion of "Self and Relational

Dysregulation: The child exhibits impaired normative developmental competencies in their sense of personal identity and involvement in relationships" (Cloitre et al., 2009).

In the psychoanalytic literature, the concept of cumulative trauma was introduced by Khan (1963). In his view, "cumulative trauma is the result of the breaches in the mother's role as a protective shield over the whole course of the child's development, from infancy to adolescence—that is to say, in all those areas of experience where the child continues to need the mother as an auxiliary ego to support his immature and unstable ego functions" (p.290). Khan (1963) discusses Winnicott's invaluable contributions to understanding the importance of the relationship between mother and infant in the first year of life. One of the possible adaptations of the infant to a caretaking environment that is not "good enough" is the development of what Winnicott (1949a) calls a 'False Self.' Tuber (2008) emphasizes that this is a bi-directional and active process, in which the baby is trying to make meaning from what he perceives. The baby becomes a 'forecaster,' and becomes adept at recognizing when it is 'safe' to be spontaneous and when the caregiver's mood prevents the expression of spontaneity and the True Self.

Emotional processing in the brain

In different ways, researchers in cognitive science as well as attachment researchers and psychoanalysts all recognize the importance of early relationships in the creation of a self, in the development of social and emotional functioning, and in the capacity for self-regulation. Siegel (2001) states that self-regulation is actually a dyadic process of mutual co-regulation, in that a child uses her parent's state of mind to make

sense of her own mental processes. “This alignment of states of mind permits the child to regulate her own state by direct connection with that of her parent. The processes of affect attunement and social referencing reveal the fundamental way in which nonverbal communication is the medium in which states are aligned” (p.81). Siegel (2001) proposes that a multi-sensory image of the caregiver’s nonverbal communication emerges in the child’s brain. By sharing nonverbal signals that provide information on primary states of mind, child and caregiver join at the basic level of “primary emotions,” thus creating the possibility for a resonant connection and “feeling felt” by each other. “These primary emotions, the *music of the mind*, are the most direct way in which the nonverbal, subjective state of one’s current mental processing can be externally expressed to another person. Such primary emotions are the profiles of activation, the flows of energy and nonverbal information, that reveal the primary essence of one’s mind” (p.84, italics added). By calling the primary emotions “the music of the mind,” Siegel emphasizes the direct link between the two in the realm of interpersonal interaction on the level of the brain.

Two main categories of brain research are implicated in understanding emotional processing. Although theories on “right brain” versus “left brain” have become more relative by increased knowledge of what happens in different brain regions, it is still worthwhile to consider them as overarching structures. During the first years of an infant’s life, the right hemisphere is dominant (Siegel, 2001). This hemisphere is mainly where the nonverbal, emotional sharing that Siegel speaks of is processed. It is also involved in self-soothing behaviors, has a “more integrated mapping of the “somatosensory system” (the representation of the body in the brain), (and) directly

regulates bodily processes" (Siegel, 2001, p.83). The left hemisphere is known for speech processing, although non-linguistic cues such as a sarcastic tone are mainly processed in the right hemisphere.

The second main area of research concerns the distinction between "direct" and more "indirect" emotional brain circuitry. Le Doux (2002) defines emotion as "the process by which the brain determines or computes the value of a stimulus" (p. 206). This sets off a process, which begins when the emotional reactions occur as bodily response (e.g. increase in heart rate). The brain registers this change in physiology as a signal that something important is happening. Often, the next step is to take action, motivated by the emotions we are experiencing.

When an emotional stimulus is picked up by the sensory receptors, this information is passed on to the sensory thalamus. From there, it can either take what LeDoux (1998) has called the low road, where the information passes directly to emotion triggering sites such as the amygdala, or it can take the so-called high road which leads through the sensory cortex before reaching the amygdala. While the latter path allows more complex information about objects and experience to initiate emotional responses such as fear (LeDoux's specialty), the former is cruder, but quicker, which can be important in life-threatening situations. Bordi and LeDoux (1992) found that cells in the amygdala can determine the loudness and intensity of sounds through the low road, which is helpful for quick determination of how close the loud-sound-producing entity is, even if its not clear what it is. LeDoux (2002) emphasizes that just because the high road involves more refined cortical processing, it doesn't mean that it is conscious. "The amygdala engages in implicit processing, including implicit learning, regardless of which

pathway provides it with sensory information. As with any other stimulus, we become consciously aware of an emotional stimulus only when that stimulus is processed by networks involved in something called working memory" (p.123). Research has shown that two prominent changes concern the suppression of the hippocampus, which is implicated in episodic memory, and the activation of the amygdala, which is responsible for the automatic response to danger and the fear reaction.

Van der Kolk (2007) maintains that traumatized individuals lose their ability to use emotions as a guide. Rather than using one's affective response to assess a situation and to make meaning before reacting, traumatized people immediately go into "fight or flight" mode. Emotions are experienced as physical states rather than as verbally encoded experiences, leaving these patients in "speechless terror" and "out of touch with feelings" (p. 193) or highly over reactive. This points to an inability to integrate immediate affective experience with cognitive and verbal processes. In the long term, these changes have lasting effects on personality development. Van der Kolk (2007), for example, speaks of impairment of basic trust, dissociation/splitting and also of excessive interpersonal sensitivity. Drawing on the work of Krystal (1978), van der Kolk (2007) also points out that the inability to identify specific emotions can lead to alexithymia. Difficulties in identifying emotions in others and misunderstanding social cues foster many interpersonal problems.

Trauma and the body

> Trauma is a letter written on the body in vanishing ink, a character of the alphabet that seems to stand alone as it emerges into view. As one letter collects other letters, a message emerges that demands to be read, to be known. I saw that this message quite often entwined the actuality of trauma with unconscious ideas and fantasies. Both the actuality of terror and the power of fantasy have effects on the body.
>
> - Annie Rogers (2006), p. 54

Part of the difficulty in treating trauma survivors lies in the fact that traumatic experience is stored in the body and affects how a person inhabits his or her body in the present. As van der Kolk (2007) states: "The body keeps the score." Trauma inscribes itself on a person's physiology, disrupting the ability to self-regulate, and results in neurochemical changes in the brain. Several different areas of the brain are implicated, including the brainstem/hypothalamus, the limbic system, and the neocortex. Van der Kolk (2007) states that these areas "control internal vegetative functions, the rhythms of life – rest/sleeping and activity; feeding; reproductive cycles; and the most elemental forms of care of offspring" (p.215). As Annie Rogers, a survivor of childhood sexual abuse, communicates so compellingly, these disruptions of fundamental bodily processes interact with unconscious fantasies and need to be understood and decoded with exquisite sensitivity.

Pat Ogden is a pioneer in the realm of somatic psychotherapy and has worked with countless trauma survivors. What makes her work so powerful is that she addresses the "repetitive, unbidden *physical* sensations, movement inhibitions, and somatosensory intrusions characteristic of unresolved trauma (p. xxix)." She uses body-centered

interventions to reduce symptoms such as intrusive sensations, smells, constriction and numbing. When she speaks of making unconscious processes conscious, she is referring to the language of the body that needs to be understood and translated to decipher its communications. Ogden is also highly attuned to the ways in which early relational dynamics with primary caregivers impact the child's cognition and belief systems, and how these beliefs in turn influence posture, body movements, and one's relationship to one's body. In the case that I will describe, my client's feelings about her body and her difficulties in taking up physical as well as emotional space came up repeatedly over the course of the treatment. Ogden (2006) states:

> The subtler movement adjustments to environmental and interpersonal cues are less obvious but crucial in determining action tendencies. For instance, if a child is repeatedly met with parental disapproval when he enthusiastically gesticulates and puffs up his chest while describing his success at a game, his expanded chest will deflate and his movements become more restricted. If the criticism is repeated, this constrained movement may become an automatic action tendency in interpersonal interactions, in turn affecting perception (p.19).

Ogden et al. describe three arousal zones. The "optimal arousal zone" or "window of tolerance" (Siegel, 1999) exists between the extremes of hyper- and hypoarousal. In this mid-level zone, a person is able to process (both internal and external) stimuli of various intensities by utilizing the "social engagement system" to self-regulate. The "social engagement system" regulates those areas of the body that are involved in social and environmental interaction. These include facial expressions, body language and movements, and tone of voice. The sending and receiving of these subtle signals is vital in ensuring a person's communicative flexibility. This level of communication is also in action when a person evaluates interpersonal encounters for potential threat. In traumatized patients, the ability to "read" their environment for these cues is often

impaired. Cumulative interpersonal trauma is especially disruptive in this sense, as the perpetrator is often the primary attachment figure. For patients who have been maltreated by their primary caregivers, the social engagement system is not available for regulation and soothing. This social engagement system also governs, and can inhibit, the modes of response in the other two zones.

If a person is bombarded with stimuli that she cannot metabolize, she may become either hyperaroused or dissociate from the experience. The hyperarousal zone is typically associated with the "fight or flight" response, which can be seen as the second line of defense when the social engagement system fails or is not appropriate. Ogden gives the example of a person trying to engage with a potential attacker on a social level, trying to distract the attacker. When this does not work, the person's body would shift into fight or flight mode. Symptoms of hyperarousal include hypervigilance, intrusive images, and dysregulated emotions.

The third zone is the hypoarousal zone, which coincides with the "immobilization" response. In cases in which both the social engagement and the fight or flight responses have failed, the last line of defense may be to "check out." In clinical terms, this can manifest in a client's sense of 'numbness,' of shutting down, and of feeling separated from one's sense of self (p. 31). Prolonged states of hypoarousal can lead to depression (Ogden, 2010).

Ogden et al. propose that traumatized clients need to process traumatic experience in this "optimal arousal zone;" if they are outside their "window of tolerance," their ability to process is disrupted. "When clients are working within a window of tolerance, information received from both internal and external environments can be integrated.

They can continually process the ongoing barrage of sensory information because they can receive and integrate current sensory input even while assimilating prior input" (p. 27). The authors stress that in this state, clients are able to utilize therapy and "simultaneously feel a congruent emotional tone and sense of self" (p.27).

In clinical practice, it quickly becomes apparent that traumatized individuals often rapidly oscillate between the extremes of hyper- and hypoarousal, and might feel that the "optimal window" is an elusive place. Ogden calls upon Bromberg's concept of "safe but not too safe" (2006) to describe the area in which therapeutic intervention can be targeted in order to expand a patient's window of tolerance. She calls this "working on the edge." "Therapist and patient must continuously evaluate the patient's capacity to process at the regulatory boundaries of the window of tolerance to assure that arousal is high enough to expand the window, but no so high as to sacrifice integration" (Ogden, 2010, p.3). In this sense, therapists must be finely attuned to their patients' non-verbal cues, as these often indicate their experience of safety and danger, as well as their level of arousal. Ogden states that this attunement is imperative in developing the patient's social engagement system.

Contributions from infant research

Four main concepts from infant research are relevant to this study. They are cross-modal correspondences, Trevarthen's ideas on rhythmic coupling, Stern's concepts of "changing with" the other and vitality affects, and Jaffe et. al.'s (2001) investigation of bidirectional coordination of vocal rhythms.

In their exploration of the contributions of Trevarthen, Stern, and Meltzoff, Beebe et al. (2003) maintain that all three infant researchers utilize the concept of cross-modal correspondences to explain how infants can sense the state of another. In a study from 1977, Meltzoff and Moore discovered that infants who are only 12 days old try to reproduce expressions they have seen on the faces of adults. In this case, visual data is translated into imitative action. Subsequent studies (Meltzoff and Borton, 1979) showed that other crossmodal correspondences also occur, such as when 3-week-old infants could recognize a pacifier of a particular shape that they had sucked on but never seen. An infant's ability to match what she sees in an adult across the different modalities is at the core of the translation that goes on between the environment and inner states, and thus is the origin of presymbolic intersubjectivity (Beebe et al. 2003b).

Trevarthen's "rhythmic coupling"

Trevarthen (1993, 1998) is also very interested in intersubjective coordination. An infant learns about changes in the caregiver's emotional state through the timing, form and intensity of the caregiver's movements and expressions. These include ""fine and rapid … glides and leaps of pitch or volume of voice, eye-brow flashes, pre-beat syllables, suffix morphemes, rhythmic details and embellishments, rapid hand gestures, quick head moves, shifts of gaze … that appear in abundance in all spontaneous conversational communication" (Trevarthen, 1993b, p. 151). Trevarthen is especially interested in the rhythm of movement and interactions, and believes that intersubjective coordination occurs through "the fundamental beat of repeating movement, short bursts of expression, repetition of rhythmic groups of movement, exaggerated dynamic

expressive ‘sentic’ forms, and precise modulation of the intensity or force of expression in a moderate to weak range” (Trevarthen, 1993b, p. 135). These patterns are entrained in time.

Trevarthen uses a theory of coupled rhythms to explain coordination both within the infant and with his coordination with a partner. “The particular temporal-spatial-intensity patterns formed by the dyad will guide actions, tune each to notice and remember them, and affect learning and memory” (Beebe et al., 2003b). In this context, Trevarthen (1998) speaks of “reciprocity in rhythmic timing” and “equivalence of movement or mimetic sympathy” (matching of form) (that) characterize protoconversation” (p. 36). This allows infant and caregiver to coordinate inner psychological states, it enables them to “resonate” with each other, and makes an empathic communication between the two possible (Trevarthen, 1993).

Trevarthen further developed his ideas on the centrality of rhythms in his concept of the “Intrinsic Motive Pulse (IMP).” This pulse coordinates and integrates controlled movements in humans. “The brain is a network of dynamic systems all obedient to a scale of rhythms that flow in unison, orchestrating their effective actions to fulfill the future-sensitive (motivated) desires and recollecting past experiences of being” (Malloch and Trevarthen, 2009, p. 8). The authors maintain that humans respond to the demands of the environment in part by rhythmic movements, “modifying inclinations and desires for the future that are founded on experiences past” (p.8). This pulse thus is implicated in the creation of intentions and in the recognition of intentions in others. Malloch and Trevarthen maintain that “we can only cooperate in relationships or in social groups by sympathetic harmonization and synchronization with this time-creating IMP, dancing

together ‘in one time’ with its rhythms and respecting the qualities of its tensions and future-oriented impulses and melodies which we share” (p.8).

Stern’s concepts of “changing with the other” and vitality affects

Like Meltzoff and Trevarthen, Stern (1985) also endorses crossmodal correspondences as centrally important in the development of an infant’s subjectivity. However, he locates true intersubjectivity at a later point in the infant’s life than either Meltzoff or Trevarthen; for him, the infant “discovers that he has a mind, and that other people have minds” around the age of 9-12 months. In line with Trevarthen, Stern believes that timing, intensity and form are the crucial dimensions of correspondences. He emphasizes that each partner in the dyad is constantly *changing with the other*. “Dynamic micro-momentary shifts in intensity over time that are perceived as patterned changes within ourselves and others” allow us, rather automatically and without awareness, to “change with” the other, to “feel-what-has-been-perceived-in-the-other” (p. 263). Affect attunement, which Stern (1985) identifies as a specific kind of intersubjectivity, is “thus defined as the cross-modal matching of intensity, timing, and “shape” (contour) of behavior, based on dynamic, micromomentary shifts over time, perceived as patterns of change that are similar in self and other. The infant perceives a mental state in the other on the basis of intensity, timing, and shape of the partner's behavior” (Beebe et al., 2003b, p.793.)

In Stern’s understanding of affect attunement, the infant becomes implicitly attuned to the feeling that lies “behind” the behavior. “An attunement is a recasting, a restatement of a subjective state. It treats the subjective state as the referent and the overt behavior as

one of several manifestations or expression of the referent" (p.161). For example, a mother's delighted expression, her joyful vocalization and a unique gesture can all be expressions of exuberance. These nonverbal metaphors and analogues with the infant's ability to recognize and translate them (albeit on a mainly unconscious level) into forms of feeling represent an important step in the infant's ability to symbolize.

Stern's (1985) concept of "vitality affects" are central to his ideas on affect attunement. Vitality affects are "those dynamic, kinetic qualities of feeling that distinguish animate from inanimate and that correspond to the momentary changes in feeling states involved in the organic process of being alive. We experience vitality affects as dynamic shifts or patterned changes within ourselves or others" (p. 156). Stern emphasizes that the tracking and attuning with these dynamic and continuous forms of affect enables one person to "be with" the other as this other's emotional experience unfolds and fluctuates over time. As Beebe et al. (2003b) point out, Stern's emphasis on the translation of perceptual events into feeling states is what sets him apart from both Trevarthen and Meltzoff, "who remain on the level of behavioral correspondences" (p.795).

In order to explain how exactly we get from perceiving affects in their incarnation as vitality affects as well as what Stern (1985) calls 'discrete categorical affects' (e.g. a sad face) to a feeling quality such as exuberance, the author calls upon Suzanne Langer's ideas on how art works. Langer (1967) proposes that the elements in art reflect an aspect of "felt life," and that they create an "illusion" of feeling. Concerning music, Langer believes that this actual physical temporal event creates the illusion of virtual time; in music, we experience time as rushed, as drawn out, as suspended. Using Langer, Stern

(1985) asks: “Is it possible that the activation contours (intensity in time) perceived in another’s overt behavior become a virtual vitality affect when experienced in the self” (p.158)?

Stern’s question predates the discovery of mirror neurons in the early 1990s by the Italian neuroscientists Gallese, Rizzolatti and their colleagues. Together with the accompanying mechanism of embodied simulation, mirror neurons provide an explanation on the physiological and neuronal level of how we are able to register crossmodal correspondences. These subsets of cells in the neocortex are automatically activated when an individual (for instance a monkey) observes another individual performing a goal-directed activity (for instance, a researcher eating ice cream). What is so extraordinary about this activation is that the same neuronal pathways are activated that would normally be discharged if the monkey were actually eating ice cream himself.

Research on human subjects has widened the exploration to the transmission of emotions through body language and facial expression (Carr, et al., 2003, Iacoboni & Dapretto, 2006). These studies found that mirror neurons also provide an “inner imitation, or simulation, of the observed facial expression. They send signals through the insula to the limbic system, which provides the feeling of the observed emotion” (Iacoboni, 2008, p.119). This field of research thus provides an answer to Stern’s (1985) question.

In his book *The Present Moment in Psychotherapy and Everyday Life,* Stern (2004) highlights the temporal contour of experience and its relationship to vitality affects and maintains that this area is insufficiently studied. He writes:

> These temporal contours of stimulations play upon and within our nervous system and are transposed into contours of feelings in us. It is these contoured feelings that I am calling *vitality affects.* They are the complement to temporal contours. In other words, by *temporal contour,* I mean the objective changes (even small) over time (even short) of intensity or quality of the stimulation (internal or external). By *vitality affect*, I mean the subjectively experienced shifts in internal feeling states that accompany the temporal contour of the stimulus (p.64).

In this study, the at times minute shifts in – in this case rhythmic – changes over time will be of great interest.

Jaffe et al.'s investigation of bidirectional coordination of vocal rhythms

In their research, Jaffe and his colleagues investigated whether the preverbal rhythms of mother-infant communication when the infant is 4 months old could predict the infants' attachment status at age 12 months. They looked at the bidirectional coordination of vocal rhythms, emphasizing the nonperiodic nature of this interaction. Infants in their first year of life actively make use of rhythms to make sense of their world, and to participate in interaction. Jaffe et al. (2001) believe that presymbolic procedural representation of dialogic timing is actively constructed by the infant at this time and leads to procedural knowledge of the infant's social environment. The infant comes to anticipate her partner's communicative patterns in relation to her own, and this is one of the crucial ways in which the infant regulates herself.

Jaffe et al. (2001) distinguished between different "modes of interpersonal temporal coupling in rhythmic durations, and their coordination" (p.90). The mode of interpersonal correlations of tempo, measured by the duration of the vocalization-plus-pause cycle, did not show a significant correlation with the mother-infant interactions. What was of greater importance was the activity level of the two partners, measured by

the ratio of mean durations of vocalization to pause. The positive correlation of activity level in the infant-mother dyad was a significant mode of 'coupling.' The authors draw a parallel to Stern et al's (1985) finding that the "dimension of change in intensity over time (activation contour)" was the main way in which caregivers and infants matched and attuned to one another.

Jaffe et al (2001) were able to show that the degree of coordinated interpersonal timing when the infants were 4 months old predicted their attachment status at age 12 months. The optimal midrange coordination of vocal rhythms predicted secure attachment. The study also showed that novelty has a large impact on coordination. An infant (just like an adult) will coordinate more highly with a stranger, and even more highly in a strange environment (e.g. an experimental lab) than with her mother at home.

Beebe, Jaffe, & Lachman (1992) have shown that the timing of adult communicative process is very similar to that of the infant-adult process, and that vocal rhythms and pauses are closely matched in a bi-directionally influencing manner. In his exploration of the preverbal rhythms of mother-infant communication, Jaffe et al. (2001) propose that these rhythms may serve as one of many crucial early guides of the developmental trajectory of relatedness. Drawing on her work with Jaffe et al. (2001), Beebe (2005) maintains that on the continuum of interactive regulation, there is an optimal midrange of vocal rhythm coordination between mother and infant in which the interaction is most flexible. If coordination is too low, both partners are behaving independently of each other, which can be interpreted as withdrawal and disconnection. However, it is also problematic if coordination is too high, because this type of "vigilant"

coordination can lead to too much predictability and even "mutually escalating over-arousal."

Beebe (2010) has significantly expanded upon the ideas of mutual coregulation and has applied them to her work with mother-infant dyads. In the most recent publication, Beebe et al. (2010) discuss "an effective form of distress regulation that is a partial or *loosely coordinated* "joining" or matching of the infant's cry rhythm, with "woe face" and associated vocal "woe" contours (vocal empathy). In this process, the rhythm (but not the volume or intensity) of the crying is matched, and then gradually slowed down" (p.24). It is of particular interest that the intervention is based first and foremost on rhythmic matching, especially on loose rather than exact matching. Beebe et al. further explain: "Because the infant does not have to orient or look, approximately matching the infant's rhythms (vocal or motoric) is a non-intrusive way of helping the infant feel sensed: someone is on his "wavelength" (p.22). Beebe et al. distinguish between implicit 'procedural' and explicit 'declarative' modes of processing. The former consists of repetitive action sequences (which are called upon in such actions as riding a bicycle, for example), while the latter have to do with symbolic representations of experience (that can be verbalized). The authors believe that the type of mother-infant treatment they are describing brings about a greater integration between the two modes. Their micro-analysis of mother-infant interactions that is informed by orienting questions that include:

(1) In the procedural bi-directional "action-dialogue," how does each individual's pattern of behavior affect those of the partner?

(2) In the declarative mode, can the parent verbally describe any of the ways in which the infant affects the parent? (p.24)

These questions are highly relevant to the proposed study. They develop the idea of bidirectional coordination in a dyad and explore the ways in which these processes can inform therapeutic process and interventions. Since I am especially interested in the bidirectional coordination of rhythms on the edges between the different arousal zones, the analysis of episodes in those transitional spaces will hopefully shed light on whether a loosely coordinated interaction will lead to a more integrated state in the client.

The relevance of infancy research for music and music therapy

Trevarthen became increasingly interested in music and music therapy, and has recently edited a book that is based on the concept of "communicative musicality." This concept was developed in collaboration with Stephen Malloch (Trevarthen & Malloch, 2000). They write: "Bodily and vocal expression is so powerful in the management of human relations that it deserves a better name. (…) we call it Communicative Musicality" (p.6). The authors locate the roots of communicative musicality in the "innate human abilities that make music production and appreciation possible" (Trevarthen & Malloch (2009), p. 4). Evidence for the biological basis of this innate musicality can be found in infant research. However, the authors widen the scope of musicality to encompass the

> expression of our human desire for cultural learning, our innate skill for moving, remembering and planning in sympathy with others that makes our appreciation and production of an endless variety of dramatic temporal narratives possible. (…) It is our common musicality that makes it possible for us to share time meaningfully together, in its emotional richness and its structural holding (…) (p.4-5).

As we enter the realm of narrative, we enter the realm of the making and sharing of meaning. For the present study, one of the central questions is how interpersonal

rhythms contribute to the creation and sharing of meaning between the two participants. For Trevarthen (2009), communicative musicality operates in the field of tension between two continua: the pride-shame continuum and the separation-interconnection continuum. The former has to do how we negotiate self-expression in the face of the appreciation and judgments or misunderstandings of others, while the latter pertains to our sense of degrees of 'belonging' with other people, hence, with relatedness.

The separation-interconnection continuum has been a focus in the work of music therapist Mercedes Pavlicevic, who early in her career also looked to concepts from infant research to inform her work. Influenced by Stern's concept of vitality affects, Pavlicevic (1990, 1991, 1997, 2000a, 2000b) developed the notion of 'Dynamic Form' in music therapy. This concept recognizes both the social music traditions that therapist and patient draw from, as well as the more specific focus of interpersonal relatedness in a music therapy improvisation.

Pavlicevic and Trevarthen (1989, 1994) collaborated on two studies exploring musical assessment and the efficacy of music therapy with psychiatric adults. They developed the Music Improvisation Rating (MIR), which was adapted for use with schizophrenic patients and became the MIR for Schizophrenia (MIR (S)). The scale measures the levels of musical engagement between therapist and patient, and is comprised of nine levels. It ranges from Level 1, "no musical contact," to Level 9, "musical partnership," with increasing mutuality throughout the last three levels. The 1994 study showed a significant improvement in clinical state in subjects who attended weekly individual music therapy sessions. The researchers also found a surprising result: the subjects in the Treatment Group showed a significant lengthening of their ability to

remain engaged in a musical improvisation with the therapist. They write:

> The sustaining of any communicative interaction, such as conversation, depends on variation and fluctuation of its content and of its musical components or prosodic features, that is, the shared "narrative or message" (…). (The) lengthening musical engagements of the Treatment Group reflects the qualitative improvement in the musical interaction; the improvisations could be developed further and for longer because the two players had "more to say" to one another (p.100).

In her more recent work, Pavlicevic has become more wary of applying extra-musical concepts to music therapy practice. In their chapter in *Communicative Musicality,* Pavlicevic and Ansdell (2009) discuss the pitfalls that result from reducing the music in music therapy to "*just* preverbal proto-music" (p.359) when applying infant research ideas and privileging the psychological dimension of the relationship. The authors believe that the use of early interaction theory favored dyadic relationships, while not paying enough attention to group phenomena as well as the social and cultural contexts in which music therapy takes place.

> Overall, this perspective stood starkly against our clinical experience as music therapists, experience that highlighted how striking the specifically musical relationship was with clients, and how such a relationship could naturally and flexibly range between intimate musical companionship and the broader musical community according to circumstance, need, and physical and cultural context (p.359).

It seems important to bear this criticism in mind, because music therapy improvisation does, in fact, take place within a matrix of personal and social experiences with and associations to musical styles. Pavlicevic and Ansdell (2009) propose the concept of 'collaborative musicing' as an extension to communicative musicality. In their view, 'musicing' takes into account specific traditions of musicianship, the social and cultural meaning of specific forms of music, as well as the performance context that it

usually occurs in. Furthermore, they see the collaborative nature of the musical experience as a development of the communicative function, from the 'I/You' experience to the experience of 'Us.'

Music therapy perspectives on trauma

Trauma is expressed through sound, music, words, breath, and silences in the context of a music therapy session. Feelings brought about by traumatic experience manifest both in overt musical behavior and expression, as well as in less conscious dynamics between therapist and patient. Robarts (2009) refers to "Both sounded and unsounded phenomena of relating" (p. 378). On the dissociative end of the spectrum, a patient may be totally cut off from her own musical expression, and therefore also unable to connect musically with the therapist. On the other end, the patient may become overstimulated, overwhelmed, and stuck in endless repetitions of the trauma. In children, this state of hyperarousal can result in aggressive behavior towards the instruments and/or the therapist, in an inability to engage in a musical dialogue, in screaming or tantrums.

In their overview of creative arts therapies for adults with PTSD, Johnson, Lahad and Gray (2009) maintain that evidence from clinical case studies in the creative arts therapies note two main areas of improvement: 1. primary symptoms of PTSD and 2. global clinical improvement. These authors believe that the scarcity of experimental research on the creative arts therapies stems from the lack of training of practitioners on research methodology and the paucity of doctoral-level programs. While it is true that most creative arts therapists graduate from Masters degree programs with relatively little

research training, doctoral programs are attracting an increasing number of candidates, and the field of research is rapidly expanding.

In the music therapy literature, there have been few empirical studies exploring the effects of music therapy on trauma. Coulter (2000) examined the impact of song-writing and recreational music on PTSD symptoms in nine adolescent subjects. The study found no differences between the groups. However, it showed a trend towards a decrease of intrusive thoughts in the songwriting condition. Clendenon-Wallen (1991) explored the effect of a 12-week music therapy group on feelings of self-confidence and self-esteem in 11 sexually-abused adolescents. The change in pre- and post-test data showed a significant increase of self-confidence and reduction of depressive symptoms.

The vast majority of literature pertaining to the use of music therapy in the treatment of trauma is in the form of individual or group case reports and vignettes. The group case studies usually describe more structured interventions, whereas the individual case reports often portray nondirective treatment. In a book edited by Julie Sutton (2002), a number of music therapists from around the world offer rich and evocative descriptions of working with traumatized children, adolescents, and adults. Mercedes Pavlicevic describes her struggles of working with clients traumatized by pervasive violence and HIV/AIDS in South Africa. Adva Frank-Schwebel from Israel describes her work with a group of anorexic young women who have a history of developmental trauma. Frank-Schwebel draws on psychodynamic theory to understand and inform her work, and understands her patients' engagement with producing and listening to sounds as an expression of unconscious relational meaning. She writes:

> Patients project onto sound and music the qualities and modalities of relating that originate in their experience of the primary object. Their regressive longings are

> sometimes displaced onto the medium of sound and made present in the sounds they produce, in a wish to hear music, or expressed in a heightened auditory sensitivity to the voice of the therapist (Bollas 1987, p.15) (p. 198).

Moving into the realm of description how trauma manifests in clinical music therapy improvisation, Sutton and De Backer (2009) coin the term 'sensorial play' to capture the ways in which trauma can 'sound.'

> Sensorial play describes the characteristic playing of patients who, while producing sounds, are not able to connect with or experience these sounds as coming from themselves. The patient's music is characterised by repetitiveness and/or fragmentation. The improvisation cannot really be begun nor ended, and there is no clear melodic, rhythmic, or harmonic development, no variation, and no recapitulation (p.76).

The author's description speaks directly to the repetition compulsion and fragmentation of memories in trauma. In their experience in musical play, they note the absence of "shared playing and intersubjectivity with the therapist," which often pushes the therapist into an isolated position in which the therapist has difficulty accessing his own creativity.

In their case vignette, Sutton & De Backer (2009) provide a transcription of an improvisation between the therapist and a severely traumatized woman, in which both participants exchange single notes on a piano. The notes seem to arise out of nothingness and fall into a void. There is no sense of continuity, and plenty of silence. Even when a tentative pulse almost emerges, the patient "loses connection with the music, preventing the melody from breathing further. At this point, the image of suffocating the music came to the therapist in somatic transference" (p.79). Further, the authors state:

> The music therapist experiences the patient as isolated, becomes completely caught up in the patient's music (i.e. the musical behaviour) and is not free to introduce his or her own musical images; because of this, no interaction is possible, and it is impossible to engage in a shared timbre in the 'co-play"' (De Backer, 2006, p. 268). (p. 76).

This is a powerful description of a musical manifestation of dissociation, and of the fragmentation of self-states that disallows coherence, a sense of moving forward, of shared dialogue and pulse. It is like musical "tunnel vision" in which the patient cannot "see" what is outside their musical "range."

Sutton & De Backer (2009) believe that the "silent embodied presence of the therapist" is of central importance. In also listening to the material that is not yet ready to be 'sounded,' the therapist communicates her commitment to being present with the patient's traumatic experience, thus allowing the patient to feel seen, heard and acknowledged.

In her work with Sally, a girl with a horrific history of sexual and physical trauma, Robarts (2009) also highlights the importance of providing a space in which stillness and a sense of safety was possible, as well as containing her patient's destructive and aggressive actions and meeting her more actively through musical interventions. Robarts speaks of providing "temporal musical 'containers'" (p.394), that promoted a sense of security and 'being held' in the music. Instruments also served an important role as objects that could withstand aggression, and offered her patient new visceral and sensory experiences. Robarts describes how Sally gradually begun to stroke the instruments, rather than kicking or hitting them. "She would then look at her hand wonderingly, almost amazed, as if recognizing her hand as her own for the first time" (p.389). Sally began to 'own' her bodily experiences, which helped her develop a more coherent sense of self. Through the work that involved improvisations with a skilled music therapist, she was able to move from a state of fragmentation, dissociation and dysregulation to a more integrated state of affect regulation, increased relatedness and symbol formation.

Robarts (2009) maintains that the "pathway of symbolization in music therapy is a dynamic trajectory from evoked levels (pre-intentional, unconscious responses at the implicit level of experiencing) to more self-directed, intentional models of expression, where imagination comes more fully into play as autobiographical narratives" (p. 386). She conceptualizes a progression that begins in a "tonal-rhythmic field of sympathetic resonance" which forms the basis for relatedness and harbors the building blocks for meaning making. The next level is comprised of "the emergence of motive signaling" and increased awareness of "expressive forms of relatedness," while the third level is the creation of narratives through "song or other symbolic expressive forms" (p. 386-387). Even though her conceptualization seems to privilege symbol formation as the main change-inducing factor, it is important to note that important mutative elements are contained in the first tonal-rhythmic level. It will be argued that rhythms contribute significantly to the creation of meaning – not so much to what music means, but to how music means.

Knoblauch's 'musical edge of therapeutic dialogue'

Steven Knoblauch (2000), an analyst and jazz improviser, refers to the musical dimensions of the analytic experience as the "musical edge of therapeutic dialogue." He maintains that "attention to the dimensions of the musical edge gives the analyst a broadened scope for perceiving meaning: the analyst's responsiveness … may be critically shaped by the nonverbal dimensions of his actions" (p. 80).

In his chapter on rhythm, Knoblauch (2000) highlights the importance of breath. He recounts a clinical moment in which he helps a dysregulated patient to calm down by

paying attention to the way in which his own breath accents his speech. In a process of rhythmic entrainment, the patient begins to breathe in synchrony with the analyst. “The feeling of flood had receded, and there now emerged the possibility for a flowing interplay of our rhythms” (p. 3). Knoblauch (2000) attributes part of what leads to change to an awareness of interpersonal rhythms. He writes: “A recognition of rhythms of exchange and an understanding of the as yet unsymbolized meanings that these constructed and carried became part of the mutative work made possible by this analytic stance” (p. 11).

Knoblauch’s (2005a) paper offers a somewhat more detailed description of how the analyst’s attention to rhythms can contribute to the understanding of what is not overtly expressed or symbolized. However, the author still mainly uses rhythm as a metaphor that describes dynamic processes, rather than exploring how the actual musical element of rhythm contributes to his understanding of what is going on clinically. An example of a slightly more in-depth musical analogy is found in the following description of a moment of interaction with a patient: “The rhythms of our eye dialogue here were quick and nervous, starting and stopping like the twists and turns that Bartók would command in his compositions, or that Cecil Taylor would explode in his piano improvisations. These syncopations, combined with our earlier sound shapes, constructed feelings of uncertainty and hypervigilance” (p.817). Through his microanalytic description of a series of interactions with his patient, Knoblauch sensitizes us to the shifts in what he calls the registers of “formed symbolic communication” on the one hand, and “acoustic and kinesthetic registers” on the other hand. However, the description quoted above relies heavily on the reader’s familiarity with the music of Bartok and Cecil Taylor’s

improvisatory style, as well as encompassing primarily Knoblauch's own associations and perceptions of these particular musical examples.

Other psychoanalytic perspectives on trauma and the arts

Music can be seen as dialogic in nature in both intrapsychic and interpersonal realms. In his eloquent paper on music and mourning, Stein (2004) describes the different functions music can manifest following traumatic experience. He contrasts the absence and muting of music in his life as a response to 9/11 with Theodor Reik's musical "hallucination" of part of the last movement of Mahler's "Resurrection" Symphony after learning of the death of Karl Abraham, his friend, mentor, and former analyst. Here, Stein sees music as a compromise formation, "a condensed symbolic transformation of unconscious mental functioning in which overwhelming affect is rendered as an auditory hallucination" (p. 788). Stein believes that these types of communication can be compared to dream material, in which "abstract primary process and content" surfaces in often chaotic and de-contextualized ways. He further posits that the "associative significance" of this material can be uncovered.

According to Stein (2004), music can also function as object relation. He writes:

> The interaction between music and a listener (or composer) is thus neither an aesthetic creation in which the wealth of human emotion inheres in toto nor a concordant sounding board that resonates sympathetically with our internal affective life, but rather might be more accurately construed as an object relation. As such, an encounter with music triggers complex intrapsychic events or responses (p.790).

Although I believe that music can, in fact, be a sounding board for particular internal affective constellations, there is value in Stein's argument that one's "encounter" with

music sets complex intrapsychic processes in motion. Stein (2004b) continues: “The aesthetic/emotional gestalt experience of music's effects within us, then, can be generally understood as comprising perceptions, distortions, and condensations of time and memory, as well as archaically derivative fantasies, defenses, and modes of internalizing, expressing, and responding to affects, all operating within an abstract primary process mode of registering, construing, constructing, and reconstructing experience” (p.790). In the context of a music therapy session, a dialogic interpersonal process is added to the intrapsychic dialogue described by Stein, and can function in the sense of the “analytic third” in that it is co-created by therapist and patient.

This dialogic intrapsychic and interpersonal aspect of music therapy is centrally important when working with a traumatized person because trauma impairs the ability to be connected to one’s own experience and therefore the ability to communicate this internal experience. Laub & Podell (1995) posit that interpersonal trauma results in the erasure of a “primary empathic bond” (p.991) and the “breakdown of trust in a functioning empathic external dyad” (p.992). The confrontation with an abuse perpetrator, for instance, leads to the loss of an internal “other” and therefore also to the loss of the representation of the other. Ultimately, the person also loses the empathic tie with himself. Whether these linked failures occur in response to a single traumatic event or several cumulative events, a latent feeling of emptiness and nothingness can result. The authors maintain that “the abandonment of listening and communication” so characteristic of trauma can be defied in art and literature through a restoration of connection. They write:

> Art has the ability to revive the enshrouded past of a trauma through a dialogue in the present. In creating a holding, witnessing ‘other’ that confirms the reality of the

> traumatic event, the artist can provide a structure or presence that counteracts the loss of the internal other, and thus can bestow form on chaos. Through such form the artist can 'know' trauma (Laub & Podell, 1995, p.993).

Giving 'form' to formless, wordless experience occurs in "real time" in music therapy, and it occurs in the presence of a receiving 'other.' In the patient Sutton and De Backer (2009) described, the internal experience of a void was given form in the silences that permeated the improvisation. This form holds the possibility of owning the experience and restoring the lost connection. Laub and Podell speak of the 'indirect' and 'dialogic' qualities of art that "often combine in their effects: the same silences and holes found in such art, in which a presence emerges from an absence, become sites of engagement in a creative dialogue with the viewers or readers" (or listeners) (p.996). They also pick up on the possibility of meaning-giving, of "generating meaning in receptive minds," which "must refer, on the deepest level, not to the illusory nature of the artistic experience, but to its role in acknowledging the realness of the trauma, and thereby in setting in motion the process of rediscovering the 'real' within both the witness and the survivor" (p.998). At times, the therapist holds hypotheses about what the music might mean. Ani Buk (2009), an art therapist, states: "The therapist makes it clear that a non-directive approach to talking about the artwork is essential, reinforcing the artist's sense of control over any verbal exchange. In the safe and containing environment of the office, the therapist, the artist/patient, and the artwork itself all become witnesses to the trauma" (p.63).

From an Analytical Music Therapy perspective, music and sound could be construed as pivotal in its referential function between verbal and nonverbal systems, especially in working with trauma. Through its sensory and bodily features, it in part

works directly in the system that Bucci (2008) calls subsymbolic, and others have called pre-symbolic. Music therapist Julie Sutton (2002) states: "Perhaps the pre-symbolic – some would say pre-conscious – level at which we experience music in the body as emotion has a special role in the work with those traumatized. Feeling grounded in one's own body while processing and assimilating the emotional impact of traumatic experience is accessible when one is musically engaged with a therapist" (p.35). At the same time, it can be part of the nonverbal symbolic system. Writing specifically about music in mourning, Stein (2004b) states: "While music can be conceived as operating outside the realm of symbolic function, as making other sorts of appeals to the psychic apparatus, I am suggesting that music be understood primarily as a symbolic expression—a simulacrum—of mental functioning that here correlates roughly with the diverse intrapsychic elements of the mourning process" (p.792).

Trauma and rhythm

In her paper on time and trauma, Terr (1984) explores what role the perception of "time" plays in psychic trauma, and how the experience of time may get distorted after a traumatic event. She also speaks about the defensive and protective mechanisms that time and rhythm can play. Rhythms are so prevalent and continuous on many levels that they often escape awareness. In a traumatic event, however, one's bodily rhythms can become a source of reference in the absence of external referents. As Terr (1984) maintains, they can also become a source of reassurance and a reminder that one is still alive. One of her patients was in a car accident that severed his spinal chord. In this most horrifying moment, he counted, saying afterwards "it was the only thing I could think of to do." Terr

proposes that the rhythm of the counting might have been soothing the way a waltz rhythm can provide comfort. She also hypothesizes that by counting, her patient was putting time between himself and the completely overwhelming situation.

In another example, Terr (1984) relates how a group of children that were abducted in the Chowchilla kidnapping sang, “If you’re happy and you know it clap your hands” during the 11-hour ride they spent in total darkness. “When the time to clap came, every child had paused for two counts without clapping. They had inadvertently set up a monotonous lulling rhythm which may have provided some small solace for a few of them” (p. 640).

Rhythm and the disruption of rhythms can also be expressions of trauma. In an evocative paper, Harjula (2002) recounts how in the analysis of a patient who had been physically abused by her father, the “breaking down of her words” and of her speech rhythms communicated “the deepest meaning of father’s beating: the threat of a destruction of self, the experience of disruption and loss of self” (p. 200). Harjula believes that the changes in rhythms, the loss of words, and the “holes in speech” constitute the “language of trauma.” “It is in this “silent language” that trauma starts to live. While the patient’s words reach for memories and emotions about traumatic experiences, the language hidden between the words speaks about the very essence of trauma – about a bodily experience and the meaning of trauma to the wholeness/disruption of self” (p. 200).

Music as a transitional phenomenon

Many music therapists have availed themselves of Winnicott's (1971) concept of the creation of a transitional space (e.g. Robarts (2003), Nirensztein (2003), De Backer & Van Camp (2003), and of music as a transitional object (e.g. Nolan (1989), Sweeney (2003), Mahns (2003), Dvorkin & Erlund (2003).

Winnicott establishes the concepts of transitional phenomena in the following manner:

> I have introduced the terms 'transitional objects' and 'transitional phenomena' for designation of the intermediate area of experience, between the thumb and the teddy bear, between oral eroticism and true object-relationship, between primary creative activity and projection of what has already been introjected, between primary unawareness of indebtedness and the acknowledgment of indebtedness (p.2).

Winnicott stresses that this is "an intermediate area of *experiencing*, to which inner reality and external life both contribute" (p.2). Winnicott (1971) conceived of this transitional space as a place in which the demand to keep inner and outer reality "separate yet interrelated" could be momentarily relinquished. In his original notion, this was crucially important for the infant's ability to self-soothe. As Grandy and Tuber (2009) point out, "transitional space is initially discrete, a presymbolic experience developed in the first year of life" (p.275). They discuss Goldman's (2003) extension of the concept into "potential space" which includes the ability for symbolization and for "engagement with the cultural surround" (Grandy and Tuber (2009), p.275).

In his discussion of these concepts, Tuber (2008) highlights the fact that transitional phenomena are positioned on the brink between fantasy and reality. He writes: "A transitional phenomenon predates established reality testing because if the

child were already fully established in her reality testing, then she would know the object couldn't fully replace her mother and she wouldn't create it in the first place" (p.150). In the music therapy context, this element plays an important role in the extended sense. Entering into an improvisation with a certain title or image in mind necessitates a certain "suspension of disbelief." The "as if" quality is clear to both partners, and yet "forgetting" about the "as if" quality allows one to enter into a very real interpersonal process that parallels Winnicott's (1958) "intermediate area of experiencing, to which inner reality and external life both contribute" (p.2). Tuber (2008) also points to the multisensory nature of the transitional object that is paralleled in the musical experience through the integration of auditory and kinetic sensory experience with affect, images.

Summary

Trauma can find its musical expression on a wide continuum; at one end of the spectrum, we find the repetitive, incohesive, and undeveloped type of improvisation of "sensorial play," while the other end of the spectrum is defined by more subtle manifestations of trauma. The dialogic nature of music offers the possibility to repair the ruptured primary bond (Laub & Podell, 1985) and tie to oneself. Like other forms of art, music enables the symbolic transformation of unconscious mental functioning.

On the level of the brain, music facilitates the access to implicit memories and their integration with explicit modes of processing, integrating the right and left hemispheres. As Siegel (2001) discussed, self-regulation is a process of mutual co-regulation, where caregiver and infant join at the level of "primary emotions," and the "music of the mind."

The contributions from infant research illuminate the ways in which the investigation of non-verbal interaction between caregiver and infant can inform insights on the rhythmic interactions between two adults in the therapeutic setting. Rhythm plays a fundamental role in communicating mental states and in the process of mutual co-regulation, especially through the bi-directional coordination of rhythms. It also plays a role in intrapsychic and interpersonal shifts from either hyper- or hypoaroused states to the "optimal arousal zone," in which an individual is able to make the most use of therapy.

Winnicott's concept of transitional phenomena provides the psychoanalytic frame within which the other two main concepts of bi-directional coordination of rhythms and the importance of the social engagement system in the "optimal arousal zone" can be held and conceptualized. The next section will explore how this study hopes to operationalize these constructs using the data of the case study.

Chapter III: Methods

In this study, I will retrospectively analyze and reconstruct a 12-session treatment that was conducted from October 2001 to May 2002. The treatment took place during the time of my Analytical Music Therapy training and was supervised by Benedikte Barth-Scheiby, who herself had been trained by Mary Priestley, the founder of AMT. The work included many Analytical Music Therapy techniques, such as improvising on dream images, coming up with titles for improvisations, and engaging in role play, in which roles would be assigned to the improvisers.

The data consists of audio-recordings of 9 out of the 12 AMT sessions, "logs" describing each session, with partial transcriptions of the verbal dialogue, and my notes on my impressions and countertransference reactions. At the time of treatment, "Christina," the Caucasian woman I worked with, was 30 years old, and married, with no children. She had recently moved to New York from another US city. Both of us knew little about each other's histories and current life situations when we started. In addition to the demographic information, I knew that her main instrument was the piano. At the end of the third session, I found out that she had experienced significant pre-birth and developmental trauma. In order to preserve confidentiality, the specific nature of this trauma will not be discussed. My client was put up for adoption shortly after birth and was taken in by a family in which the emotional climate was very stormy and unpredictable, mainly due to her adoptive father's moods. One of my patient's main goals was to explore using her voice. "When I use my voice to say what it is that I really feel or

what I'm really experiencing, it's something that in many ways I'm just beginning to do in my life" (Session notes, first session, 10/20/01).

One important contextual factor that is worth mentioning, especially given the trauma-focus of this study, is that the first session occurred on 10/20/01, a little over a month after the World Trade Center attacks of 9/11. This impacted the content of the first session, and will be kept in mind in working with the data as a whole.

I have chosen data from this course of treatment for three major reasons. First, the analytical focus and in-depth involvement of this treatment makes it a very rich source of data. Second, my training in psychodynamically-informed clinical psychology makes it possible to contextualize and analyze these data from a vantage point that is unique and that I did not have access to prior to this training. It not only enables me to contribute a nuanced psychodynamic perspective to the music therapy literature, but also fosters an integration of psychological and music therapeutic aspects of trauma that will hopefully add to the evidence that music therapy is particularly well suited as a treatment modality for this population. Third, the case-study format is a viable way in which to explore the complex intersubjective nature of a therapy relationship.

Both psychoanalytic literature and music therapy literature are particularly rich in case reports. In an era in which there is pressure to provide evidence-based treatment results, case studies must not be dismissed as "mere opinion" (Sackett et al., 1996). Case studies offer an exploration of process and change that occurs throughout treatment; this information is not captured by pre- and post measures. In their discussion of psychodynamic treatment for traumatized adults, Kudler et al. (2009) state:

"Case studies neither provide ultimate tests for psychodynamic hypotheses nor define the limits of psychopathology, theory, or technique. They do, however, provide the groundwork for hypotheses that can be tested empirically." The music therapist David Aldridge (2005) also argues for the validity of case studies, especially in the creative arts therapies:

> Single case designs are particularly important for the creative arts therapies as they allow for a close analysis of the therapist-patient interaction. We can compare differing sets of data throughout a course of treatment. Personal change is considered within a patient, not by comparison within a group norm. (…) Such process research allows the therapist to see, or hear, how the emerging phenomena of therapeutic change are related to their therapeutic activities, hence the emphasis on single case designs for the promotion of theory building based on clinical practice and in generating data to support new models of intervention (p. 27).

It is hoped that delving into the nuances of a single case will mirror and do justice to the depth and complexity that characterizes both psychoanalytic work and clinical music therapy practice.

Therapeutic Narrative Analysis

As a frame for analyzing the data from the vantage point of my three constructs, I will utilize the outline of Therapeutic Narrative Analysis (Aldridge & Aldridge, 2005, 2008). This flexible form of research design can include quantitative data, and is hermeneutic in that it attempts to understand the creation of meaning in therapy, and how we understand the world (Aldridge & Aldridge, 2005). A central aspect to this method is the concept of episodes. Episodes are defined as events or as a sequence of events that make up the therapeutic narrative and form the basic unit of inquiry. In this context, the narrative is the "story" that brings the episodes together.

Table 1
The phases of Therapeutic Narrative Analysis (Aldridge (2005), p. 33)

Phase 1: Identify the narrative	Gather the material together that will form the narrative. This may be a case study, or it may be a series of case studies. It is the story that you wish to tell.
Phase 2: Define the ecology of ideas and settings	Explicate the theoretical ideas present in the literature or from your own standpoint. This is the initial locating of research context in the wider perspective of current knowledge (Context 1). Define the setting in which the narrative occurred. This will include details of the place of practice, the demographic details of those involved and may include historical details (Context 2).
Phase 3: Identify the episodes and generate categories	Identify episodes that are crucial for analysis. Generate a set of constructs from that episodic material and identify categories for analysis.
Phase 4: Submit the episode to analysis	Analyze the episodes according to their contents using the guiding framework of the constructs. At this stage it is possible to use a regulative rules based hypothesis. It is also possible to submit episodes for categorical confirmation to colleagues.
Phase 5: Explicate the research narrative	Synthesize interpretations based on therapeutic traces to form a therapeutic narrative.

The process of therapeutic narrative analysis can be broken down into five phases. Phase 1, "Identify the narrative," in the case of this dissertation, is the case study. In Phase 2, "Define the ecology of ideas and settings, " the case is situated in the context of what music therapy can contribute to the treatment of trauma, past research on music therapy and trauma, on the neurological, somatic, and psychological underpinnings of trauma, and on a psychoanalytic perspective.

In Phase 3, "Identify the episodes and generate categories," episodes will be selected based on the constructs of bi-directional rhythmic coordination and shifts in the client's mental state. The episodes will be drawn from those musical segments of the sessions in which both therapist and patient improvised music together. First, an overview of the duet improvisations will be achieved by listening to all the improvisations, with a particular emphasis on the rhythmic interactions between the two participants. Then, episodes will be selected that have the potential to elucidate the

constructs of bidirectional rhythmic coordination, and shifts in mental states. These episodes will then be transcribed for a close analysis of the bi-directional coordination, and all of the duet episodes will be rated for shifts in mental states. To maintain feasibility, the bar-by-bar transcriptions of music will focus on only the rhythm for the most part, and only the most salient episodes will be transcribed.

In Phase 4, the episodes will be used to test the three hypotheses that are central to this study. The interventions will be analyzed retrospectively, and form part of the dynamic interplay between therapist and patient. The second level of interplay occurs between the understanding and the observable actions that make up the therapeutic encounter. As G. Aldridge (2005) writes: "This interplay of understanding and actions forms the narrative. Stories have plots, characters, meanings, and events. So too with music therapy sessions; there is a plot, therapist and patients, meanings, and musical exchanges" (p.47). The insights and interpretations gleaned always trace back to the data: the musical exchanges in the therapy sessions.

In Phase 5 of the analysis, the insights are woven together to form the narrative of the discussion chapter. Winnicott's ideas about transitional phenomena will serve as one of the lenses through which the results will be viewed. It is hoped that this narrative will trace the development of the rhythmic aspect of interpersonal communication, and that the context of trauma will provide a fruitful backdrop for the discussion.

Microanalysis

Research in psychoanalysis has made extensive use of microanalysis as a tool for exploring subtle, and at times microsecond processes that escape conscious awareness.

The field of music therapy is also increasingly embracing this method. Wosch and Wigram (2007) give the following working definition:

> Microanalysis is a detailed method investigating microprocesses. Microprocesses are processes and changes/progressions within one session of music therapy. The amount of time can be one minute (moment) or five minutes (therapy event) of one session, one clinical improvisation (episode), or one complete session. To analyze process over time, several microanalyses can be undertaken to look at several events (p.22).

This study will use microanalysis to explore the development of interpersonal rhythmic interaction in the musical improvisations. Analyzing the chosen episodes in this way will enable a description of the development of rhythmic interaction between therapist and client over the course of treatment. It will engender a closer examination of the moments in which the therapist feels that "something has just happened." These subjectively felt moments are rich and complex in their interpersonal meanings. By analyzing the rhythmic dimension of these interactions in relation to the shifts in the patient's self states, I hope to find patterns and more insight into these crucial and fascinating moments in clinical work.

Description of measures

The first level of analysis will involve a bar-by-bar analysis of the rhythms of the two participants. After transcribing the rhythm of the different episodes, the rhythmic interaction will be described by translating into words how it unfolds on a moment-to-moment basis, and by exploring whether there are moments in which the patient's rhythm influences the therapist's rhythm and vice versa.

The second level of exploration will track the musical manifestations of shifts in the client's mental state. By using the Improvisation Assessment Profiles (IAP), developed by music therapist Ken Bruscia (1987), I will describe both the development of musical elements that influence the mental states represented in the music, as well as the role relationships between the improvisers. Four out of six IAP profiles were chosen to rate the improvisation episodes. They are the IAP profiles of tension, variability, salience, and autonomy. The tension, variability, and salience profiles describe how certain musical elements evolve over the course of the improvisation, whereas the autonomy profile specifically deals with the kinds of role relationships formed between improvisers. Each of the profiles is comprised of five gradients. I propose that the following groupings of gradients correspond to the mental states of hyperarousal, "window of tolerance," and hypoarousal.

Table 2
IAP ratings for shifts in mental state

	Hypoarousal ←		**"Window"**	→ **Hyperarousal**	
	1	2	3	4	5
tension	hypotense	calm	cyclic	tense	hypertense
variability	rigid	stable	variable	contrasting	random
salience	receding	contributing	conforming	controlling	overpowering
autonomy	dependent	follower	partner	leader	resister

The tension profile describes how much tension is created within and through various aspects of the music, and the extent to which the musical element accumulates, sustains, modulates, and releases tension. The five gradients of the tension profile are: hypotense, calm, cyclic, tense, and hypertense. With the focus on rhythm, these gradients can be used to describe the rhythmic properties of the improvisation episode as follows:

1. Hypotense: Rhythm does not influence the tension in the music.
2. Calm: Rhythm is manipulated to sustain steady state of low tension, or tension is continually released.
3. Cyclic: Rhythm is manipulated to accumulate and release tension, and to balance low and high tension.
4. Tense: Rhythm is manipulated to sustain steady state of high tension; climaxes are powerful and frequent.
5. Hypertense: Rhythm is manipulated to sustain unrelenting states of tension.

The variability profile describes the extent to which each musical element stays the same or changes over time. The five gradients are: rigid, stable, variable, contrasting, random. Applied to the element of rhythm, the gradients can be described as follows:

1. Rigid: Rhythm stays the same throughout the episode of improvisation, and is repeated in a persistent, meaningless manner.
2. Stable: There is an active effort to preserve, maintain, and repeat a rhythmic idea; variation is ornamental.
3. Variable: There is a balance between stabilization and change; the amount and rate of change is moderate.
4. Contrasting: There are dramatic changes that are substantial, quick, or meaningful, e.g. thematic contrasts in successive rhythms.
5. Random: Rhythm lacks focus could be fragmented, discontinuous, diffuse, distorted, or exaggerated.

The salience profile describes how much prominence and control each musical element is given. The five gradients are: receding, contributing, conforming, controlling, overpowering.

1. Receding: Rhythm is not a prominent element and is entirely dependent upon and overpowered by other elements.
2. Conforming: Rhythm conforms to other musical elements, and is neither receding, nor overpowering.
3. Contributing: Rhythm supports and controls the other musical elements with equal frequency.
4. Controlling: Rhythm controls most of the other elements and has the most prominence.
5. Overpowering: Rhythm is so prominent it obliterates most other elements.

Bruscia's autonomy IAP determines five different types of rhythmic relationships between therapist (T) and client (C), from the perspective of the client's role. The author differentiates between the rhythmic ground, which is the basic pulse of the music that you could tap your foot to, and rhythmic figures that overlay this basic pulse (e.g. a rhythmic idea made up of long and short notes). The following are the five gradients of the autonomy profile:

1. Dependent: C incessantly synchronizes with or imitates T's rhythms; C has no musical identity, is neither soloist nor accompanist.
2. Follower: C offers rhythmic grounds more often than figures, synchronizes with or imitates T frequently, C is more accompanist than soloist

3. Partner: C offers rhythmic figures as often as grounds, supplying half the rhythmic ideas for development, C is equal level of soloist and accompanist.
4. Leader: C offers rhythmic figures more often than grounds, supplies most rhythmic ideas for development, more soloist than accompanist
5. Resister: C focuses exclusively on her own rhythms, complete disregard for other's rhythms, soloist without an accompanist.

Description of the gradient groupings corresponding to mental states

This study proposes that 3 groupings of gradients can be used to describe the musical manifestations of the mental states of hypoarousal, optimal arousal ("window of tolerance"), and hyperarousal. The episodes that make up the improvisation segments to be analyzed will be assigned a gradient of each profile, in order to see whether patterns emerge that correspond to the different arousal states.

1. Hypoarousal

Table 2.1
Descriptions of IAP ratings for Hypoarousal

	Hypoarousal	
		1
tension	hypotense	rhythm is not manipulated with sufficient energy to create tension
variability	rigid	persistent, meaningless repetition of rhythm
salience	receding	rhythm is entirely dependent upon and overpowered by other elements.
autonomy	dependent	client takes exclusively rhythmic follower role, no musical identity, incessant synchronizing with or imitating partner's rhythms

It is proposed that the state of hypoarousal has the musical qualities of being hypotense (tension profile), rigid (variability profile), and receding (salience profile). In

terms of rhythm, this means that the rhythm is not part of what creates musical tension, that it is repeated stereotypically and without musical intention, and that it takes the back seat compared to other musical elements, such as volume, melody, or harmony. In terms of the musical relationship between the improvisers, it can be assumed that the client plays a dependent role, and does not have an own rhythmic identity.

2. Optimal arousal/ “window of tolerance”

Table 2.2
Descriptions of IAP ratings for optimal arousal

	"Window"	
	2	
tension	calm	rhythm is manipulated to sustain steady state of low tension, or tension is continually released
variability	stable	active effort to preserve, maintain, repeat rhythmic idea, variation is ornamental
salience	contributing	rhythm supports and controls the other musical elements with equal frequency
autonomy	follower	partner is largely responsible for rhythmic quality/content, offering rhythmic grounds more than figures
	3	
tension	cyclic	rhythm is manipulated to accumulate and release tension, there is a balance
variability	variable	balance between stabilization and change, amount and rate of change moderate
salience	conforming	rhythm consistently supports and follows other elements
autonomy	partner	C & T contribute equally to rhythmic quality/content, offering rhythmic figures as often as grounds, supplying half the rhythmic ideas
	4	
tension	tense	rhythm is manipulated to sustain steady state of high tension, climaxes are powerful and frequent
variability	contrasting	dramatic changes that are substantial, quick, and meaningful
salience	controlling	rhythm controls most of the other elements and has the most prominence
autonomy	leader	client consistently controls/gives direction to rhythm, offers most rhythmic ideas

In the state of optimal arousal, or "window of tolerance," the musical qualities in terms of tension range from calm, through cyclic, to tense. The range of variability is from stable to variable to contrasting, and in terms of salience, rhythm's prominence ranges from contributing to conforming to controlling. Finally, the client's role relationship can range from follower through partner to leader.

3. Hyperarousal

Table 2.3
Descriptions of IAP ratings for Hyperarousal

	Hyperarousal 5	
tension	hypertense	unrelenting, overwhelming state of tension, overstimulated and overstimulating.
variability	random	lack of focus, changes are drastic, frequent, abrupt, meaningless
salience	overpowering	rhythm is so prominent it obliterates most other elements
autonomy	resister	C continually evades or destroys any leader-followed relationship with partner, blocking out T's rhythms

The state of hyperarousal is musically represented as hypertense (tension profile), random (variability profile), and overpowering (salience profile). The rhythm corresponding to this mental state produces overwhelming tension, and is unrelenting. At the same time, it lacks focus, and changes in rhythm are often abrupt and drastic. Furthermore, rhythm overpowers all other musical elements. The client's musical relationship to the therapist is that of a resister, "marching to the beat of her own drum," blocking out any rhythmic ideas the therapist might offer.

Statement of the hypotheses

Having described the measures that will be used to analyze the improvisation episodes, the following are the hypotheses that will be examined in this study.

Hypothesis 1: Following the work of Jaffe et al. (2001), and Beebe (2005, 2010), spontaneously improvised, musical interaction between patient and therapist in a music therapy session will (a) produce bi-directional, co-regulating rhythmic interaction, as manifest in both improvisers being rhythmically influenced by the other, and (b) lead to periods of loose mid-range coordination, as manifest in loose rhythmic matching between the participants.

Hypothesis 2: Following the work of Ogden (2006), spontaneously improvised, musical interaction between patient and therapist in a music therapy session will (a) produce shifts in the client's mental state, as measured by changes in the IAP profiles, and it will (b) produce the mental state of the "optimal arousal zone", as manifest in IAP ratings that fall in the range of optimal arousal.

If it is possible to show that the patient reaches an "optimal arousal zone" within the musical improvisations, is there any variation of time spent in this mental state when three discreet times in the treatment are compared? The times will be chosen from the first session, from a session in the middle of treatment, and from the last session.

Hypothesis 3: If Hypotheses 1 and 2 are confirmed, there will be a correlation between shifts in the client's mental states and shifts in the interpersonal rhythmic interaction between therapist and client. Periods of "optimal mid-range coordination" will facilitate a shift into a state of "optimal arousal." This will be assessed by an analysis of the temporal configuration of periods of mid-range coordination and optimal arousal.

Chapter IV: Results

18 improvisations were analyzed to test the three hypotheses. The improvisations varied in length, ranging from 2 minutes to 9 minutes 30 seconds. In one of the improvisations, Christina played alone. In most of the improvisations, Christina began to play without the therapist, so there is a solo part and a duet part in 13 out of 18 improvisations.

Aim 1: Assessment of bi-directional co-regulation and loose mid-range coordination

Hypothesis 1: Following the work of Jaffe et al. (2001), and Beebe (2005, 2010), spontaneously improvised, musical interaction between patient and therapist in a music therapy session will (a) produce bi-directional, co-regulating rhythmic interaction, as manifest in both improvisers being rhythmically influenced by the other, and (b) lead to periods of loose mid-range coordination, as manifest in loose rhythmic matching between the participants.

It became clear over the course of analysis that it would be useful to limit the term "bi-directional co-regulation" to those musical exchanges in which active back-and-forth rhythms were being exchanged. Although the improvisations in which the therapist used the music therapy technique of "grounding" could also fall into the broader category of bi-directional co-regulation, in the sense that the therapist seeks to regulate the client through providing a rhythmic ground and in turn is also regulated by her participation in the music, it was decided not to include these improvisations in this category.

Of the 17 improvisations with a duet component, 7 met criteria for active bi-directional co-regulation and for loose mid-range coordination. The following section will describe how bi-directional rhythmic co-regulation and loose mid-range coordination manifested in each of the improvisations.

Session 5, Improvisation #5

In this improvisation, Christina begins a driving 8th-note rhythm on the metallophone. After about 17 bars, I come in on the piano, playing low, sustained single notes for about three bars before joining her eighth-note rhythm for 1 bar. I again switch to a slightly less driven accompaniment, before "surrendering" to her driving rhythm for another 8 bars. In this instance, I am joining her, up-regulating my own internal state.

In bar 22, we both simultaneously break this rhythm; Christina plays quarter notes instead of eighth notes, and I play an off-beat accompaniment. This "break" lasts two bars, and then it's back to the eighth notes. This represents the first moment in which Christina down-regulates a little, matching my state, although it is fleeting. I then continue alternating between a two-bar break and the eighth note rhythm, while she maintains the driving eighth notes throughout. However, in bar 32, she switches to a bar of quarter notes. I join her, and, for two bars, we are locked into the same rhythm, the first real "settling down" of the piece.

This leads to a new section of the improvisation. My single note, sustained accompaniment seems to engender slower, calmer playing on her part. It does not last for long, however. Four bars later, and the eighth-note train is back on track, chugging away.

I hop on for two bars, but then again leave more space. In this section, we continue to negotiate the difference in our internal states, and where we "feel" the music should go.

Then, something interesting happens. The music comes to a halt, and a free-rhythm call-and-response section begins. After playing a few beats together, we alternate a beat each, getting faster and faster, until both of us play wildly all over the keyboard and the metallophone for a few seconds. In this section, a very direct exchange (the call-and-response part in which only one person plays at a time) is followed by a period that could be perceived as dysregulated (the wild playing). However, in the musical context, the dysregulation is contained and can be a playful and shared experience.

This section is followed by another short call-and-response part, after which Christina initiates the original tempo, first with quarter notes, then eighth notes. However, the eighth notes are now part of a musical phrase incorporating quarter notes. Just before the piece ends, Christina adds a surprise element – she hits a nearby drum instead of one of the metallophone bars, and integrates this new instrument into her rhythms. After two bars of energetic eighth notes, in which Christina mainly plays the drum, the rhythm briefly return to quarter notes before coming to an abrupt stop.

This improvisation meets criteria for loose mid-range coordination, as there is a rhythmic interaction in which both participants match each other's rhythms with varying degrees of exactness. The periods in which both of us are playing the same rhythm are rare, but a rhythmic relatedness continues throughout the piece. In the call-and-response section, there is at first a closer matching in the sense that one beat is responded to by another beat, with variations in volume and pitch. However, in the "wild playing" section what is matched is not the exact rhythm, but more of the rhythmic gestalt. At the same

time, it also represents a break from mutuality, which will be discussed further in the next chapter. Towards the end of the improvisation, there are a few bars in which both participants are locked in the same eighth note rhythm, but the last few bars are again marked by an inexact, jaunty type of rhythmic relatedness.

Session 5, Improvisation #6

Christina begins this improvisation with tentative beats on the drum that become more insistent. I soon enter with a loud chord cluster on the piano, followed by a tremolo (a rapid alternation between chords) and more chord clusters, partially in response to Christina's drumming. Because this is an improvisation in which I am in the role of an impatient, annoyed parent, and Christina is in the role of a needy, attention-seeking child, we have a verbal exchange interspersed with music that has call-and-response elements to it as well as loosely matched rhythmic exchanges.

About a minute into the improvisation, Christina picks up another percussion instrument that is made out of shell husks and makes a rattling sound. I continue with my spoken in-role "admonishments," and dissonant piano clusters and tremolos, which at times coincide with the intensity and length of Christina's rattling sounds. In terms of bi-directional rhythmic co-regulation, the roles assumed by both participants impact the "regulation" aspect of the interaction. Rather than attuning to Christina, my rhythms in part aim to drown hers out. However, the intensity of her insistence, which musically manifests in louder and faster drumming, for example, has a direct, up-regulating impact on my rhythms, in that they get more intense as well.

After a while, the music opens up a little in the sense that we are playing over each other less, and there is more of a call-and–response feel to our interaction. When Christina says: “Pick me up,” I alter my piano accompaniment. It becomes rhythmically steady, and continuous, and harmonic, as well as softer. Christina speaks in a free rhythm, while rattling softly. Even though her speech rhythms are non-periodic, they can be seen as musical phrases because they occur at specific points within my 4-bar harmonic structure. I begin to rhythmically sing some of her words, reflecting them back to her with a very similar musical phrasing, while continuing my soft piano accompaniment. Christina stops rattling after a while, then rattles again very softly, as the music fades out.

In the first part of this improvisation, loose mid-range coordination occurs less on the level of discrete rhythms that are directly related to each other, and more on the level of the loose coordination of rhythmic gestalts. Christina’s percussive sounds and verbal pleas find their resonance in my percussive use of the piano and my verbal responses. In the second half of the piece, the matching, while continually loose, becomes closer, as we fall into a musical 4-bar-structure, which contains and soothes.

Session 7, Improvisation #7

This improvisation begins with a solo intro, in which Christina first plays the cabasa, a percussion instrument that has loops of steel ball chains around a wide steel cylinder and can have a grating sound. She plays in an a-rhythmic manner, and then switches to rhythmic playing on the drum. The basic beat she plays sounds somewhat like

a heartbeat, but she intersperses these more steady beats with fast subdivisions that start softly, but then build up, like a wave.

After a while, I join her at the piano, playing rhythmic dissonant clusters. The music is unpredictable. For the first 17 bars of playing together, Christina and I are not totally in synch, as there is not a locked-in sense of sharing the same pulse. I stop matching the driven quality of the music in bar 17and open up the space for something else to happen. This leads to a brief call-and-response interaction (bars 18-20), in which I mirror first one, then two of Christina's beats, leading her then to play a four-note pattern that will become the musical leitmotif for the rest of the improvisation. This pattern consists of three eighth notes, followed by a dotted quarter note.

A leitmotif refers to a recurring theme, which can be rhythmic, melodic, or harmonic in nature, and which can be found in different guises throughout the piece. This rhythmic leitmotif is a pattern consisting of three eighth notes followed by a dotted quarter note. To me, it summons the association of someone banging on a door.

The call-and-response interaction engenders a better sense of a shared underlying pulse. In the preceding bars, Christina plays the leitmotif several times (bars 26, 27, 30-31, also in a variation with extension in bars 28-30). Then, in bar 35, I introduce a harmonic shift, which again has the effect of opening up the music. At the same time, Christina plays the leitmotif with its extension of two additional dotted quarter notes. In the second half of that same bar, I mirror the original pattern, which is followed by a trading back and forth of this pattern in an interlocking pattern. I then change my accompaniment, briefly falling "out of time" in bar 40, and settling in to a tremolo, a pattern of two rapidly alternating notes that is sometimes used to indicate a state of

suspense. Just as I end this tremolo, Christina plays the pattern again, which I respond to in a slightly altered form, leaving out the first eighth note, and thus turning it into a three-note-pattern. Thus, I am not directly mirroring what Christina is playing, but altering it slightly, while still maintaining its character. After trading these patterns back and forth, it is Christina who introduces a short break, but then she picks up the original tempo again, playing the pattern. I respond with another variation, this time adding a quarter note and an eighth note before the original pattern. Christina then mirrors this variation of the motif. In bars 54 through 58, we trade off the three-note variation of the pattern I had introduced in bar 46-47. This time, she throws in a new variation (bar 56-57). I do not immediately mirror this variation, but do so one bar later, thus acknowledging that I heard her. In bars 60-61, she restates the extended version of the pattern, and repeats this in bars 63-65. In response, I first play the three-note variation, but then switch to trading off the original pattern with her in bars 67-68 and 69-71. After a final statement of the extended version of the pattern, the improvisation ends, initiated by Christina's very soft playing.

In this improvisation, a pronounced period of loose mid-range coordination begins after the call-and-response interaction of bars 19-21. The "optimal window" begins in bar 35, and lasts almost until the end of the improvisation.

To summarize, the main ways in which loose midrange coordination occurred in this improvisation was:

1. Both participants mirrored each other's patterns with variations and time delay.
2. "Breaks" from mirroring allowed for the eventual return to thematic material and the recognition of being heard.

3. The regulation was mutual in the sense that both participants initiated the breaks and variations.

Session 7, Improvisation #8

This improvisation, with the theme of "critical voices," is a follow-up to the preceding piece. After Improvisation # 7, Christina spoke about feeling paralyzed by internal critical voices that came up for her as she was presenting a project at work. She stated: "It's very frustrating because I tend to … I presented it in a very awkward way, and there was a small part of myself that said, "Why do you have to hide? What you create – like it. This doesn't need to be" (Session notes, Session 7, 2/23/02). I reflected to her that there seemed to also be some anger in the preceding improvisation, and asked her what meaning the big drum crescendi might have had. She replied: "There are moments when I get back to my own self, my own ground… it felt like my reluctance to completely be overtaken by the critical voices." I suggested a follow-up improvisation to give voice to the inner critics. Christina asks: "Are you sure? They're pretty mean. You would not want them at your party."

In the music that follows, the rhythmic co-regulation between Christina and myself starts from the very beginning. Christina plays a bass drum, and I play a drum with a higher pitch. We quickly establish a joint rhythm consisting of one beat on her drum followed by two beats on my drum. Over this repeating rhythmic motif, Christina begins to give voice to her internal critics, starting with: "Listen to that voice. You can't even think. You did it again." I occasionally reflect her words back to her. Since we are

creating one rhythm together, there is constant, close bi-directional co-regulation in this section. Here, we function as two parts of the same sound-creating organism.

A shift occurs when I fit my spoken response ("Shame. Be ashamed.") into the rhythmic framework of the drum accompaniment, changing the non-periodic nature of speech to a more periodic one. Christina takes this up, and begins speaking more rhythmically as well. This coincides with a shift in her rhythmic accompaniment. She establishes an eighth note pattern, which I reflect in a dotted eighth note pattern. At this point, we become two separate musical entities, with more distinct individual rhythms. As the tension builds, the pattern of our new accompaniment is occasionally interrupted by a return to an interlocking rhythmic pattern that we established at the beginning of the improvisation.

The music is characterized by fluctuations in the volume; an exceptionally pronounced one happens after a 7-bar section in which the volume drops to an almost inaudible level. Suddenly, Christina shouts "stupid, stupid, stupid!" This is accompanied by loud quarter notes on the drum followed by her eighth note accompaniment. I continue with my half of the interlocking pattern, which we had established at the beginning. After a few more bars of back and forth, there is a two bar sequence in which both of us spontaneously play almost interlocking off-beat drum beats. Following this, Christina rhythmically repeats a longer string of words ("you can't do it, you can't do it, you can't do/ I know you couldn't do it, you couldn't do it, do it, do it!"). In response, I sing in a mocking way: "you couldn't do it, you couldn't do it!" Here, I use the "universal teasing melody" with a dotted eighth note rhythm (often, kids will use this melody, singing "na na na na na"). Christina takes up part of this rhythm (and melody) at the end of her next

string of words. It seems that we are up-regulating each other in this section of the improvisation, getting further into the affect associated with the critical voices.

The final section of the improvisation is marked by a shift in the content of Christina's words – she begins to talk back to the critical voices by saying: "I don't care what you say, yes I can!" This is accompanied by empathic drumming, often in synchrony with the rhythm of her words. In this section, there is not as much overt rhythmic interaction between the two of us; Christina's rhythms are in the foreground, and I am mainly in a supporting function.

In this improvisation, the loose mid-range coordination criteria are reached after the initial section in which there is not much separation between us rhythmically. In the following sections, our rhythms are still closely related, but there is more evidence of the type of interlocking and loosely matched rhythms described in some of the preceding improvisations. It seems as though the closer matching at the beginning of this piece helped Christina to express the critical voices that she felt paralyzed her. As she begins to connect with her voice, and her body through rhythmic speaking and drumming, she can tolerate a looser matching from me. Metaphorically and musically, she finds the strength to push back ("I don't care what you say – yes I can!").

Session 10, Improvisation #12

In this session, Christina spoke about a dream related to her feelings about religious faith and spirituality. A key image in the dream was beating one's chest in Catholic mass at the moment that signifies the death of Christ. In the dream, the beating motions were accompanied by the phrase "mea culpa," which means "my fault" in Latin.

Christina brought this image and these words into the context of her self-critical stance. She tried saying to herself: "Quit beating yourself up about this" (Session notes, Session #10, 4/6/02). We decide to improvise on the dream.

At the beginning of this improvisation, Christina starts playing the drum by herself, interspersing drum crescendi (gradual increases in volume) with cymbal beats and beats on a lower bass drum. The music is characterized by dramatic fluctuations in volume and speed. After she starts to play a steady beat on one of the drums, I join her. I play the same pulse on a tone bar, which is a pitched, single note percussion instrument. I begin playing mainly eighth notes to her quarter notes, and add some variations, just as she adds variations by interjecting a beat on the other drum. She plays a drum roll in tempo, which I reflect on the tone bar. Then, Christina integrates some sixteenth notes in her rhythms, adding some tension to the music by playing a gradual crescendo. I maintain my steady eighth note accompaniment. In this section, bi-directional rhythmic regulation occurs on a subtle level, with a few rhythmic exchanges that are directly related to each other, such as the drum roll.

In the transition to the next section, Christina plays a few bars of soft sixteenth notes, after which I begin chanting rhythmically in made up Latin. The music has a foreboding quality to it. Christina plays one bar of a noticeably different rhythm, marking the end of my chant, and then switches back to the sixteenth note accompaniment, while I vocalize softly on one note. Over a steady accompaniment, Christina begins to vocalize, on long drawn-out notes that increase in volume and rise steadily higher in pitch. After eight bars of this, I begin chanting "mea culpa." My chant is rhythmic, in eighth notes, and adds to the sense of tension in the music. Shortly after Christina reaches her highest

pitch, she vocalizes rhythmically in quarter notes, before her voice drops off and she clears her throat.

Christina then starts vocalizing a three-bar phrase that is polyrhythmic in a very interesting way. She half-moans, half-sings descending "ohs" that approximate a three-against-four beat. She repeats this phrase four times, with varying intensity in her voice. In the middle of the first repetition, I begin to make moaning sounds that are arrhythmic. In response to my sounds, Christina increases the intensity in her voice momentarily, but it soon drops out, and the music fades out.

Christina's poly-rhythmic shift has implications for the bi-directional co-regulation that is going on between us. Her half-moaning, off-beat utterances alert me to the fact that something is going on. At that point in the improvisation, I suddenly felt quite nauseous and constricted in my throat. This leads me to make arrhythmic moaning sounds myself. Retrospectively, I have the sense that this bodily countertransference reaction had to do with a regression, perhaps even related to the pre-birth trauma that Christina experienced. Again, confidentiality concerns preclude a more detailed exploration of this event and its possible meaning. On a structural level, the relatively abrupt ending of the improvisation suggests that Christina felt the threat of being overwhelmed by her bodily sensations and/or affective reactions. This moment hints at music's power to cut through defenses, and to access memories and feelings that are deeply somatically embedded.

In this improvisation, loose mid-range coordination sets in almost from the beginning of the section in which we play together. After some directly related rhythms, the rhythmic interplay in the next two sections takes place on a level of providing a

steady accompaniment, as well as a rhythmic counterpoint (my "mea culpa" chants to Christina's long notes). When Christina introduces the polyrhythmic descending moans, I add non-periodic moaning sounds myself. The looseness of the matching gives Christina the space to vocally explore her manifold associations to the dream image, circling around themes of guilt, shame, and sacrifice.

Session 11, Improvisation #15

This improvisation centers on the image of a big, white stone, and a sculptor, who is working on the stone with a big knife. Christina stated: "I was thinking about how in some ways at work, I swing from extremes from being not stone-cold or stone-dead but more inertia, withholding, afraid to just come out, I guess the same things I was talking about in the very first session. (…) Also, on the other side, furiously trying to make it happen, to chip away and make something from this – the discipline, the stuff that gets in my head: "Work, work, work, it's not enough."

The music begins with a-rhythmic percussion sounds. Christina plays the claves, an instrument consisting of two wooden sticks that are beaten together, and I play a variety of percussion instruments including a shekere, an African percussion instrument with beads around a gourd. After a while, I initiate a spoken dialogue ("There's no air in here"), which Christina picks up on, while we continue to create a percussion sound scape. Even though this section is arrhythmic, there is bi-directional interaction of non-periodic rhythms.

After about two minutes, Christina plays a steady beat on the claves, while continuing to speak. I reflect a few of her phrases back to her. After another minute,

Christina's playing shifts to double-time, and becomes louder, as she becomes more emotional, and also begins to speak louder ("Someone wants to come down and pull me out (of the stone)." She then returns to her original claves rhythm, interspersed with occasional eighth notes. I sing some of her words rhythmically, which Christina picks up on, from then on continually singing her words. I accompany her on a tone bar and with my voice. Our singing interaction increases towards the end of the improvisation, with me in a mainly grounding role, reflecting her phrases until the music ends.

Here, loose mid-range coordination takes place mainly towards the end of the piece, in the exchange of sung phrases that are similar in rhythm.

Session 11, Improvisation #16

In this improvisation, a follow-up to the preceding piece, the bi-directional rhythmic co-regulation begins almost from the beginning of the improvisation. Before the music, Christina stated: "I think I'm due for some playful music, it's been a long road." After she explores the metallophone for a few measures in a free rhythm, I play a little trill on the piano, which she responds to with a metallophone trill. I repeat a note on the piano, and she mirrors the general feel of my musical contribution. There is a brief section in which Christina continues exploring her instrument in a free rhythmic manner, while I provide a sustained and free accompaniment. Soon, we coalesce around a shared pulse. Christina plays in a dotted eighth note rhythm while I play a quarter note rhythm. We have another "trill exchange", and a few bars later, I reflect her swiping over the metallophone keys in an upward motion by swiping the piano keys in a downward motion.

After another 15 bars of the original combination of her dotted eighth notes with my quarter note rhythm, she initiates a quarter note rhythm call-and-response section in which we trade a measure of quarter notes back and forth. Then, I introduce a bit of dissonance, which she responds to by altering her dotted quarter note rhythm to two bars of triplets. My introduction of change in harmony in the following bars also leads her to respond with a different rhythm, this time in quarter notes. After she switches back to the triplet rhythm, I begin to vocalize, singing long notes on "ah." A few bars later, Christina vocalizes, and we enter a section of trading off vocalizations.

After the vocalizations subside, Christina creates some rhythmic tension by playing first her original dotted eighth note rhythm and then the triplet rhythm for three bars. She begins to play a marked quarter note rhythm, which I follow. While she plays a few variations, I maintain this rhythm, and this section feels very much together. Christina's playing is so emphatic that one of the bars pops off the metallophone. After this event, I alter my accompaniment slightly, and the music becomes somewhat calmer. A few bars later, she introduces a melody with a few more sustained notes. I respond to this by singing the teasing melody again, a reference to a previous session, as well as a rhythmic and harmonic reference to her melody.

Christina's response to this is playful; she picks up an ocarina, a flute-like wind instrument. For a few bars, she keeps a beat on the metallophone with one hand, while holding the ocarina to her mouth with the other. Her ocarina notes are sustained at first, and then become more rhythmic. Christina then plays a rhythmic phrase that I reflect with a rhythmic phrase of my own. My phrase interlocks with her phrase, and is not quite the same, but similarly off-beat. We enter a brief call-and-response-like segment, which

is not quite matched up. Christina plays some longer notes, I speed up my accompaniment, she speeds up with me, and then, in response to my tremolo, she plays long, drawn out notes. The music becomes soft and tender, with a free rhythmic feel, and I match my sparse piano accompaniment to her making wind-like sounds of varying intensity on the ocarina. The music fades out.

Loose mid-range coordination occurs throughout this piece, and allows for a very high level of flexibility and playfulness within the interaction.

Summary of results for Aim 1

Hypothesis 1 was supported. It was found that spontaneously improvised, musical interaction between patient and therapist in a music therapy session does, at times, produce bi-directional, co-regulating rhythmic interaction and it also leads to periods of loose mid-range coordination between the participants.

Bi-directional rhythmic co-regulation was achieved in the following ways:

- by matching and or partially mirroring actual rhythms
- by matching rhythmic gestalts (c.f. Stern's "vitality affects," Pavlicevic's "Dynamic Form")
- through call-and-response playing within an ongoing musical pulse
- by mirroring/matching musical gestures, such as sweeping over keys.

It was also found that breaks in mirroring and matching are important aspects of mutual co-regulation. These breaks occurred in the following ways:

- creating breaks in the steady flow if the music, often initiating a free-tempo/ arrhythmic call-and-response section
- "wild," out-of-tempo playing (random notes all over the particular instrument)
- polyrhythmic shifts
- arrhythmic sections (e.g. arrhythmic percussion sounds)

Aim 2: Assessment of musical manifestations of shifts in mental states and presence of the "optimal arousal zone"

Hypothesis 2: Following the work of Ogden (2006), spontaneously improvised, musical interaction between patient and therapist in a music therapy session will (a) produce shifts in the client's mental state, as measured by changes in the IAP profiles, and it will (b) produce the mental state of the "optimal arousal zone", as manifest in IAP ratings that fall in the range of optimal arousal.

Using the Improvisation Assessment Profiles (IAP) of tension, variability, salience, and autonomy, the improvisations were analyzed to see whether tracking the development of rhythm and role relationships between the improvisers could capture shifts in mental states. As a reminder, the rating scales for the profiles are comprised of five gradients. Please refer to pages 49 to 52 for a full description.

Furthermore, it was proposed that the following groupings of gradients correspond to the mental states:

- Hypoarousal: Rating: 1
- "window of tolerance:" Ratings 2 through 4 in all categories, and
- Hyperarousal: Rating 5

Table 3
IAP ratings for shifts in mental state

	Hypoarousal	←	**"Window"**	→	**Hyperarousal**
	1	2	3	4	5
tension	hypotense	calm	cyclic	tense	hypertense
variability	rigid	stable	variable	contrasting	random
salience	receding	contributing	conforming	controlling	overpowering
autonomy	dependent	follower	partner	leader	resister

In the "window of tolerance" or "optimal arousal zone," "various intensities of emotional and physiological arousal can be processed without disrupting the functioning of the system" (Siegel, 1999, p.253).

Results for Aim 2: Assessment of musical manifestations of shifts in mental states and presence of the "optimal arousal zone"

Out of the 18 analyzed improvisations, 9 met criteria for shifts in mental states that were represented by shifts in the IAP profiles. The shifts occurred in several different ways: there was mutual "up-regulation, " mutual "down-regulation," brief changes in mental states that returned to what the state was before the change, and also shifts to what this study calls the "window of tolerance" state.

Most of the improvisations received ratings that stayed within the "optimal arousal zone." The exceptions will be discussed at the end of this section. None of the ratings reflected "pure" states of hypoarousal or hyperarousal across all dimensions of tension, variability, and salience. Usually, the ratings reflected a mixture of levels across the categories.

The following section contains a description of the shifts in IAP profiles and mental states that were found in the 9 improvisations.

Session 3, Improvisation #2 – solo piano

Table 3.1
IAP rating for segments of Improvisation #2

	1. 21:28-22:24		2. 22:25 – 23:10		3. 23:11 – 23:59		4. 24:00 – 24:20	
		#		#		#		#
Tension	Cyclic	3	Cyclic	3	Tense	4	Cyclic	3
Variability	Stable	2	Variable	3	Contrasting	4	Stable	2
Salience	Contributing	3	Contributing	3	Contributing	3	Contributing	3
Autonomy	-	-	-	-	-	-	-	-

In this improvisation, Christina plays the piano by herself. In the first section, which is rhythmically somewhat free, the tension is cyclic, variability is stable, and rhythm is contributing in terms of salience. The next section sees an increase in rhythmic variability (stable to variable). In the third section, the tension shifts from cyclic to tense, with powerful and frequent climaxes involving rhythmic accents. Due to a shifting sense of the down-beat and contrasting rhythmic ideas, the variability rating changes from variable to contrasting. Although rhythm is very prominent in this piece, it blends with harmony and volume to create overall effect, and is therefore homogenously rated as “contributing” throughout the improvisation.

In terms of shifts in mental states, the third section moves towards hyperarousal, but returns to a more midrange arousal state in the final section.

Session 4, Improvisation #3

Table 3.2
IAP rating for segments of Improvisation #3

	1. 9:05- 10:02		2. 10:03 – 10:52		3. 10:53 - end	
		#		#		#
Tension	Cyclic	3	Tense	4	Cyclic	3
Variability	Contrasting	4	Contrasting → random	4 →5	Contrasting	4
Salience	Conforming	2	Contributing	3	Contributing	3
Autonomy	Leader	4	Leader/partner	4/3	Leader	4

The tension in this improvisation is cyclic at first in the sense that the built-up tension is continually released. Then, it changes to more climaxes without much release, so the rating shifts to tense. The final section sees a return to cyclic tension. The variability seems to shift between contrasting, with meaningful, quick changes, to somewhat random due to more fragmented rhythms in the second section. In the last section, the rhythm is once again more meaningful and organized. In terms of salience, the rhythm becomes a bit more prominent in the second and third sections. Throughout most of this piece, Christina takes a leader role, supplying most of the rhythmic ideas, although there is slightly more role-parity in the second section.

There is a brief mutual up-regulation in the second section, with a subsequent return to the pattern of the first section.

Session 4, Improvisation #4

Table 3.3
IAP rating for segments of Improvisation #4

1. 20:14 – 20:57 2. 20:57 – 23:15 3. 23:16 – 23:4 4. 42:01 – 24:48

	Rating	#	Rating	#	Rating	#	Rating	#
Tension	Cyclic	3	Cyclic	3	Calm	2	Calm	2
Variability	Variable	3	Variable	3	Variable → Stable	3 → 2	Stable	2
Salience	Contributing	3	Contributing	3	Contributing	3	→receding	1
Autonomy	-	-	Leader	4	Leader	4	Partner	3

For the first two sections of this piece, the rhythm is cyclic. There is a rhythmically intricate, sung melody over a steady drum beat accompaniment, to which I add a sung accompaniment in the second section. Christina's sung polyrhythm initiates a calmer section, which persists throughout rest of the piece. The rhythm also becomes stable, and recedes in salience in the last section, which is mainly comprised of audible, a-rhythmic breathing. Whereas Christina was in the leading role in the second and third section, she becomes more of a rhythmic partner at the end, when there is a trade-off of breathing sounds.

Overall, there is a move towards down-regulation in this improvisation.

Session 5, Improvisation #5

Table 3.4
IAP rating for segments of Improvisation #5

1. 11:29-12:11 2. 12:12 – 13:25 3. 13:26 – 14:04 4. 14:05 – 14:30

	Rating	#	Rating	#	Rating	#	Rating	#
Tension	Cyclic →tense	3 → 4	Cyclic → tense	3 → 4	Tense	4	Tense	4
Variability	Stable	2	Variable	3	Contrasting/ random	4 / 5	Contrasting	4
Salience	Controlling	4	Controlling	4	Controlling	4	Controlling	4
Autonomy	-	-	Leader	4	Partner	3	Leader	4

Here, Christina sets the tone with a driving, repetitive melodic introduction on the metallophone. The rhythm is cyclic, verging on tense. It is stable in that a rhythmic idea is repeated, and rhythm is the controlling musical element. In the second section, I join Christina's beat on the piano, and the rhythm becomes more variable, as we enter into rhythmic interaction. The third section is characterized by non-periodic call-and-response, contrasting with dramatic changes such as tremolos, while bordering on random at times. The periodic rhythm returns in the final section, but its quality remains tense, contrasting, and it remains the controlling musical element.

Christina gives up the leader position only for a moment in the third section of this piece. In terms of shifts in mental states, there is a subtle shift towards up-regulation from an already driven and energetic baseline.

Session 5, Improvisation #6

Table 3.5
IAP rating for segments of Improvisation #6

	1. 18:28 – 20:30		2. 20:31 – 22:43	
	Rating	#	Rating	#
Tension	Tense	4	Calm	2
Variability	Contrasting	4	Stable	2
Salience	Controlling	4	Conforming	2
Autonomy	Follower/ Partner	2/3	Follower	2

This improvisation has two very distinct sections. Because of the role-assignment, I take a very active role as the annoyed, rushed parent, while Christina is the pleading child in the first section. The rhythm shifts from tense, with unpredictable and intense climaxes, to a very stable, simple rhythmic accompaniment. It moves from contrasting to stable, and in terms of salience, it changes from being the controlling musical element to conforming to other elements, notably harmony. The roles have an impact on Christina being more in the follower position.

The mental state shift is in the direction of a significant down-regulation in the second half of this piece.

Session 7, Improvisation #8

Table 3.6
IAP rating for segments of Improvisation #8

	1. 13:40 – 15:37		2. 15:38 – 16:29		3. 16:30 – 18:52	
	Rating	#	Rating	#	Rating	#
Tension	Calm →cyclic	2 →3	Cyclic→ Tense	3→ 4	Tense	4
Variability	Stable	2	Variable	3	Contrasting	4
Salience	Controlling	4	Controlling	4	Controlling	4
Autonomy	Partner	3	Partner/Leader	3/4	Leader	4

In this improvisation, there is a steady increase in (rhythmic) tension from calm to cyclic to tense, which is driven mainly by Christina. The variability of the rhythm also increases from one in which there is mainly one rhythmic idea to dramatic, substantial changes. Throughout the piece, rhythm controls most other musical elements, as it consists of drumming and spoken words. Christina transitions from a partner role to a leader role by the end of the improvisation.

In terms of shifts in mental states, there is a move towards hyperarousal. Christina shouts "stop, stop, stop, stop – let me go!" This expression is facilitated by and is contained within the music. Therefore, she does not become hyperaroused, but remains in the "window of tolerance."

Session 10, Improvisation #12

Table 3.7
IAP rating for segments of Improvisation #12

1. 7:08 – 8:00 2. 8:01 – 8:49 3. 8:50 – 9:19 4. 9:20 – 10:12

	Rating	#	Rating	#	Rating	#	Rating	#
T	Tense	4	Cyclic/tense	3/4	Calm/tense	2/4	Tense	4
V	Contrasting	4	Contrasting	4	Stable	2	Variable	3
S	Controlling	4	Controlling	4	Conforming	2	Contributing	3
A	-	-	Leader	4	Follower	2	Leader/partner	3/4

5. 10:13 - end

	Rating	#
Tension	Cyclic	3
Variability	Stable	2
Salience	Conforming	2
Autonomy	Leader	4

Christina begins this improvisation by herself, interspersing drum beats with cymbal crashes. There are powerful rhythmical climaxes, dramatic changes, and rhythm is at the

forefront of musical elements. When I come in on the tone bar in the second section, the tension shifts towards being cyclic, as there is a bit more release. In the third section, I start chanting a made-up Latin phrase; here, the rhythm is both calm and tense at the same time. Although the rhythm of the chant is relatively simple, Christina's underlying accompaniment of sixteenth notes adds to the sense of foreboding. As she starts vocalizing in the fourth section, the tension builds. The rhythm turns cyclic only at the very end.

The changes in the dimensions of variability and salience follow a similar trajectory. Rhythm controls the first two sections and is contrasting in nature. In the third section, it drops in salience to conforming, and to stable in terms of variability. There is a slight rise in variability and salience in the fourth section, which drops off again at the end. Christina's roles change from being a leader in the second section to taking a follower role as I begin to chant. However, when her vocalizations begin, she assumes more of a leader role.

This is an interesting improvisation in terms of mental states. Overall, the tension of the music suggests a more aroused state. However, something shifts at the end, during Christina's polyrhythmic vocalizations. Taking my intense countertransference into account, it seems as though the music ends before a shift to hypoarousal becomes manifest. Christina's coughing and my own feelings of nausea and shortness of breath at the time point to a powerful unconscious somatic process that was taking place. Here perhaps is one example in which music facilitated a regression that may have been overwhelming to Christina, and so the improvisation came to an end.

Session 11, Improvisation #14

Table 3.8
IAP rating for segments of Improvisation #14

	1. 12:25 – 15:35		2. 15:36 – 18:35	
	Rating	#		#
Tension	Calm	2	Cyclic	3
Variability	Stable	2	Variable	3
Salience	Controlling	4	Contributing	3
Autonomy	Leader	4	Leader	4

Although a change in mental state is audible in this improvisation, it is not adequately captured by the methods of this study. The ratings indicate that the rhythmic tension level changes from calm to cyclic, that rhythm becomes more variable, while at the same time losing its status as the controlling musical element. However, in listening to Christina's singing and the sound of her voice, one hears a shift into a more aroused state. The limitations of the measuring system in this instance will be discussed in more detail in the discussion chapter.

Session 11, Improvisation #15

Table 3.9
IAP rating for segments of Improvisation #15

	1. 21:50 – 24:59		2. 25:00 – 27:53		3. 27:54 – 31:20	
	Rating	#	Rating	#	Rating	#
Tension	-	-	Calm	2	Calm	2
Variability	Random	5	Stable	2	Variable	3
Salience	Receding	1	Conforming	2	Contributing	3
Autonomy	Partner	3	Leader	4	Leader	4

The first section of this improvisation is comprised of random percussion sounds. Therefore, a tension rating was not possible. Since the rhythms are entirely non-periodic, rhythm is receding in terms of salience. In the second section, a stable beat underlies the spoken dialogue, which began in the first section. Christina moves into a leader role;

rhythm conforms to other musical elements. In the last section, the calmness of the rhythm persists, but there is slightly more variability, and it is more salient, contributing to what is going on in the music.

The shift in mental state in this improvisation is facilitated by the organizing function of the music. From a random, fragmented place, there is a shift to a state closer to the "window of tolerance."

Summary of the results for Aim 2

Hypothesis 2 was supported. It was found that spontaneously improvised, musical interaction between patient and therapist in a music therapy session does, at times, produce shifts in the client's mental state that were reflected in shifts in the IAP ratings. Furthermore, it also produces the mental state of the "optimal arousal zone," as defined by the IAP ratings in zones 2 through 4. The only times the ratings fell out of the range of the "optimal arousal zone" where two ratings of "random" variability, two ratings of variability verging on "random," one rating of "receding" rhythmic salience, and one rating of rhythmic salience verging on "receding." As will be discussed more fully in the next chapter, random, fragmented, or diffuse rhythms can fulfill important roles within mutual co-regulation. Furthermore, moments in which rhythm is receding in terms of salience should be seen as ordinary fluctuations of prominence of musical elements.

The second element of Hypothesis 2 pertained to whether there was any variation of time spent in the "optimal arousal zone" when three discrete times in treatment were compared. The proposed chosen time periods were from the first session, a session from the middle of treatment, and from the last session. Since practically all of the

improvisations fell into the rating scheme of the "optimal arousal zone," no increase in time spent in this zone could be found.

It may be more useful to look at the quality and amount of time spent in active musical interaction. The table below shows the duration of the musical duets that, together with the solo time, made up the improvisations. The times in brackets refer to duet time in which there was not much direct interaction because I was in a more holding/supportive musical role. It is noteworthy that there is somewhat of an increase in "duet time" throughout the course of treatment.

Table 4
Overview of Duet duration in all analyzed improvisations

Session	Improv #	Duration duet	
1	1	(3:12)	
3	2	N/A	
4	3		2:55
	4		3:46
5	5		2:17
	6		4:05
7	7		2:17
	8		5:20
	9	(2:40)	
8	10	(3:20)	
	11	(3:45)	
10	12		3:10
	13	(2:00)	
11	14		4:50
	15		3:25
	16		6:55
12	17	(3:10)	
	18	(1:50)	

In terms of the quality of the interaction, Improvisation #16 is a very good example of sustained, engaged playing that promotes a high level of freedom and mutuality at the same time. In the very last session, my participation returned to a more supporting stance, as Christina integrated her gains and stood "on her own two feet" musically.

Aim 3: Assessment of possible correlation between shifts in mental state and shifts in rhythmic interaction

Hypothesis 3: If Hypotheses 1 and 2 are confirmed, there will be a correlation between shifts in the client's mental states and shifts in the interpersonal rhythmic interaction between therapist and client. Periods of "optimal mid-range coordination" will facilitate a shift into a state of "optimal arousal." This will be assessed by an analysis of the temporal configuration of periods of mid-range coordination and optimal arousal.

The analysis revealed that although shifts in the interpersonal rhythmic interaction had an impact on shifts in Christina's mental states, no direct correlation between the two variables was evident. Since most of the improvisations fell into the "optimal arousal" category, periods of "loose mid-range coordination" could not be described as facilitating shifts into the "optimal arousal" state. Thus, Hypothesis 3 was not supported.

However, a qualitative analysis of the interaction between shifts in interpersonal rhythm and shifts in mental state yielded the following observations:

1. In Improvisation #5, a brief period of playing in unison is followed by a "settling into" the same rhythmic pulse in a deeper way. A non-periodic call-and-response section, characterized by mutual up-regulation, follows this section.
2. A similar brief moment of unison playing in Improvisation #7 is followed by a section in which almost all the ratings are 3s, which indicates a firm position in the "optimal arousal zone." Even though this section just lasts for 20 seconds, it seems to be enough to lead to a new locked-in shared pulse and more optimal "loose-midrange coordination" which lasts throughout this piece.

3. In Improvisation #8, the shift into a more rhythmic manner of speaking seems to impact the mental state shift, which enables Christina get deeper into the affect of the sentiments expressed through the words and music.
4. In Improvisation #12, Christina's shift into polyrhythm and then the abrupt ending of the music point to a shift in mental state. My hunch is that she was trying to avoid getting deeper into the improvisation because hyperarousal may have resulted. There is another example of polyrhythm in Improvisation #4, which results in Christina's down-regulation.

Summary

Given that Christina was frequently overwhelmed by affect in the verbal parts of the sessions, it is remarkable that the musical improvisations were almost all within the "window of tolerance." The next chapter will begin with an exploration of how musical improvisation facilitates rhythmic co-regulation, what breaks in the rhythmic co-regulation might signify and how non-traumatic rhythmic ruptures may be distinguished from traumatic ones. Further, the relationship between loose midrange coordination and the mental state of optimal arousal will be explored in the context of the existing literature. A discussion of the clinical implications of this research will be framed within Winnicott's concept of "transitional phenomena," and will include thoughts on how the findings can be applied to psychodynamic verbal psychotherapy.

Chapter V: Discussion

This study explored how musical improvisations were used in the treatment of a woman with a history of cumulative trauma. Of special interest was how rhythmic interactions between client and therapist developed over the course of the work. The findings of this study indicate that musical improvisation fosters bi-directional rhythmic co-regulation and facilitates an arousal state called "window of tolerance," in which the client can make the best use of the therapeutic space.

In this chapter, concepts pertaining to the psychology of expectation are used to explore how rhythm facilitates co-regulation. These ideas are then applied to the findings of the study. This section also includes a discussion of periodic, non-periodic and a-rhythmic sections, as well as rhythm's link to bodily experience and to culture.

Rhythmic expectations and bi-directional co-regulation

Rhythm is intricately linked with the psychological processes of anticipation, expectation, and predictability. In his fascinating book entitled *Sweet Anticipation: Music and the Psychology of Expectation,* the musicologist David Huron (2008) explains how rhythm works on a psychological level, based on how people predict events. Although he writes primarily about previously composed music, his ideas can be applied to improvised music as well.

Huron points out that an individual's ability to accurately anticipate an event is biologically valuable in two ways. First, successful anticipation allows for an optimization of arousal levels and therefore a minimization of energy expenditure. If we

can predict when to lift our hand to catch a ball, for example, we don't have to waste energy tensing up and getting ready. Second, successful anticipation facilitates attention. In traumatized populations, these internal regulatory mechanisms have often gone awry. As Ogden (2006) discussed, hypervigilance and hyperarousal are very common. Huron states that failures in accurate anticipation can lead to "frenzied mental activity," either when the anticipated event does not occur or when the timing of a specific event was not anticipated. Thus, the ability to predict what will happen next can be of great benefit to a traumatized individual for whom the world is a scary and unpredictable place.

Rhythm can evoke internal mental states and emotions based on its predictability on the one hand and the possibility of playful thwarting of expectations on the other hand. This is intricately linked with rhythm's role in bi-directional co-regulation. Furthermore, rhythms can be periodic or non-periodic. Periodic rhythms establish regular time intervals upon which we can base our predictions as to when to expect the next beat. The downbeat in a regular, periodic rhythm is of special significance in terms of prediction, and, as Huron explains, we often associate the downbeat with a pleasurable sensation. It simply feels good to know when to stamp your foot or tap your hand. However, the positive emotion we attribute to the stimulus (the down-beat) is actually caused by our accurate prediction. This is called the prediction effect.

In improvisations such as the ones analyzed in this study, rhythm was one of the musical elements that established predictability and therefore created a safe container, in which Christina could "go on being" through time. Since I was actively involved in the music-making, my ability to form rhythmic predictions also helped me to self-regulate. Christina could experience her ability to play with rhythmic expectations in intentional,

as well as intuitive, not fully conscious ways as empowering. This can especially useful to those who feel disempowered by past trauma. Thus, musical improvisation can facilitate mutative experiences by creating a space in which the participants know what to expect and in which they can actively create breaks in the flow of the music.

Syncopation, off-beats, and polyrhythms

Huron states that syncopation, in which the accent falls on a beat that is not usually accented or stressed, and missing downbeats can also evoke powerful emotions, such as pleasure. "Rather than manifestations of the *prediction effect*, these other rhythmic devices are forms of controlled surprise that achieve a positive affect through *contrastive valence"* (p. 185). Huron explains that in this type of contrastive valence, the initial negative effect created by the thwarting of expectation is quickly replaced with positive affect. This is experienced more strongly due to its contrast and colors one's appraisal of the whole event.

Huron continues:

> Although it is possible to have "good surprises," the surprise itself always indicates a biological failure to anticipate the future. Thus, surprises activate a fast neural pathway that initiates one of three conservative responses: *flight, fight, or freeze.* These responses can be subsequently suspended, inhibited, or amplified by another reaction response or by a slower appraisal process. In the case of music, appraisal responses typically conclude that the situation is safe, and so the fast responses are rapidly extinguished (p. 362).

Applying these ideas to traumatized populations, it could be argued that rhythmic surprises in a musical improvisation provide an opportunity to practice the suspension of omnipresent misjudgment of events that lead to flight, fight, or freeze responses. Since

these surprises happen on a much smaller scale than in the everyday life of someone with a trauma history, they are not so overwhelming, and are more likely to be integrated.

Let us look at some of the instances of breaks in rhythm from the analyzed improvisations. Some of these breaks seem a little more consciously initiated than others, and others seem to just "happen," sometimes as if "out of the blue." In Improvisation 5, for example, there is a break in the flow of the rhythm in the third section. Although it is not quite clear who initiates this break, Christina takes a lead in the call-and-response section that follows. She is the one who accelerates into the "wild playing" segment, she is the one who stops it, and after a short period in which we both are trying to "read" each other in another call-and-response section, she initiates the resumption of the original tempo and rhythm. In short, she is (mostly) in control and can create an experience in which she can both predict what is going to happen next and titrate the degree of connection to me. As another example, the short section in Improvisation 7 that constitutes a break in rhythm and incorporates a brief call-and-response section functions as a way to increase predictability and mutuality after a "rocky start," in which it was difficult for me to entrain to Christina's rhythms.

In the analyzed improvisations, there were two prominent examples of polyrhythm that are interesting to think about in more depth. One of them can be found in Improvisation 12 towards the end. This is the piece in which I start chanting in Latin and Christina vocalizes with increasing intensity, leading to her polyrhythmic moaning. In this instance, Christina's three-against-four beat creates a syncopation in which the sense of the downbeat is shifted and everything feels slightly "off-kilter." The important aspect is that the "frame" of the music is maintained, and therefore serves to contain the "off-

kilteredness." Huron (2006) writes: "Syncopation only *challenges* metric perceptions; it never annihilates meter. In order for syncopation to exist, it is essential to maintain normal (unsyncopated) metric expectation. Syncopated schemas piggyback on unsyncopated ones" (p.303). The idea that there is a fundamental, underlying meter (schema) that does not get annihilated, but continues to go on is again directly related to trauma work. Different self-states may push up against each other in the safety of a frame that goes on in time. Thus, the self can be experienced as continuous, without the threat of fragmentation. Interestingly, in this improvisation, as Christina goes deeper into the expressed affect, and as I start to make non-periodic moaning sounds, there seems to come a point in which the threat of fragmentation does loom, and the music ends.

The point is not to completely avoid any signs of fragmentation. Often, it is possible for a client to convey the feeling of fragmentation with jagged rhythms or edgy breaks without getting overwhelmed, within the frame of musical expression. In verbal psychotherapy, it can also be immensely useful to pay attention to these types of rhythms as they manifest not only in the spoken back-and-forth, but also in the manifold non-verbal communications that pass between therapist and patient, including body language, facial affect, and gestures.

Knoblauch's "polyrhythmic weave"

Knoblauch (2011) takes up the idea of polyrhythmicity, which continues his exploration of how musical and embodied elements contribute to meaning making in verbal psychoanalytic practice. The author zeros in on a clinical moment in which

something shifts rhythmically between his patient and himself, after an unexpected (and therefore unpredicted) pause. Speaking about Warren, his patient, he writes:

> His previously steady, fast moving, stream is now being marked with slight accents, accents that break up the flow unexpectedly. *This rhythmic variation, in itself, communicates affective impact from him and constitutes a nascent shift in me.* (Italics in the original.) I can feel my internal "mindlock" where I can find no thoughts and no words… no smart clinical strategies to contain, modulate, or begin to transform Warren's emerging pain" (p.418).

Knoblauch goes on to explore how this rhythmic rupture made him aware how he and Warren were caught up in a manic defense. He uses the concept of polyrhythmicity to explain what happens on a rhythmic level after the pause. "*Polyrhythmicity* as a metaphor for organizing micromoments of human interaction can open up fascinating and clinically useful possibilities for narrating analytic interaction that extend current psychoanalytic interest in how embodied communication accompanies and interacts with verbal interpretation" (p.420).

In my view, awareness of rhythmic shifts and ruptures is not only useful on a metaphoric level, but on an actual physiological, kinesthetic, psychological and interpersonal level. If we think back to Huron's idea that surprises activate either flight, fight, or freeze responses, even if only on a split-second, micro level, then the changes that Knoblauch notices first in Warren's speech rhythms and then in his affect (fear and anger) take on an interpersonal significance of a different sort. Often, these interactions take place on a preconscious level, but if they can be retrospectively picked up on, they may be of significant use in the therapy context.

Periodic and non-periodic rhythms versus a-rhythmicity

In the study conducted by Jaffe et al. (2001), the authors emphasized the non-periodicity of the rhythmic coordination between the infants and caregivers they were observing. They analyzed the interactive patterns of the level of activity, which were characterized by dialogic rhythmic coupling rather than simply a matching of tempo. The present study offered the unique advantage of comprising both periodic and non-periodic rhythmic interactions. In addition, there were a-rhythmic sections within larger rhythmic frameworks. Here, I will explore the possible functions of non-periodic rhythms within the periodic framework of musical improvisations, and well as the role of a-rhythmic sections.

In his discussion of non-periodic temporal expectation, Huron (2006) maintains: "Although periodicity helps listeners to form temporal expectations, periodicity is not necessary for the formation of such expectations. It is important only that the listener be experienced with the temporal structure, and that some element of the temporal pattern be predictable" (p.187). The call-and-response sections in the improvisations of this study are a prime example of this. Even though the underlying pulse is no longer present in these segments, both participants share the expectation that a musical utterance of one person will be followed by an utterance of the other person. It is further assumed that when one person speeds up, the other person will follow. Often, there is an excited quality to these exchanges, because there is a slight unpredictability, and the possibility that one of the players will not abide by the musical "rules."

The a-rhythmic sections do not follow any rules, and thus, it is not possible to predict musical events with any accuracy. However, if the a-rhythmicity is intentional

and not the result of an inability to form connections between sound events (prevalent in lower-functioning, highly traumatized clients) it is possible to surrender into this space, and to shelve the need for accurate anticipation of what will happen next. Some of the a-rhythmic segments in the analyzed improvisations have the character of "parallel play," in which both participants are engaged in their own sound universe. There may be some relatedness, but relatively little mutuality.

These a-rhythmic sections may serve the function of what Benjamin (2002) has called "periods of creative disengagement," in which an individual can be absorbed in her own rhythms. In this article, she discusses the work of Louis Sander (1988), whom she quotes: "Disengagement in a state of equilibrium in the system is a condition that favors the achievement of a sense of agency in the infant and the sense that its motivations and goals are its own" (p.69, quoted on p. 44). The "state of equilibrium" is an important component in this context; in a chaotic environment of disequilibrium, both participants would experience this type of disengagement very differently.

Rhythm's link to a sense of agency and the body

The agency which can be found in the rhythmic interaction both with oneself, in a period of creative disengagement, and with others, be it in dyads or larger groups, has its roots in bodily experience. As mentioned several times in this study, music's ability to make us want to move is based on the organizing and integrating function of rhythmicity. Benjamin (2002), again commenting on Sander's work, touches on this when she speaks about the way in which rhythmicity functions to "hold together" complex systems. This idea is also closely related to Trevarthen's notion of the "Intrinsic Motive Pulse," which

draws on past experience, but also enables a future-oriented appraisal of other people's intentions.

The tension between the need for separation in order to develop a sense of agency on the one hand, and the need for connection and the realities of dependency on the other are constantly played out in rhythmic terms. In the therapy room, we negotiate attunement and lack of attunement, rhythmic entrainment, and rhythmic ruptures. Taking up the context-inclusive concept of a "wider ecology" (Jaffe et. al, 2001), Knoblauch (2011) writes:

> This "wider ecology" provides the lens for the analyst to "see" and "hear" a mutative patterning, a *polyrhythmic weave* in which attunement is not just an experiential moment of match; in which rupture is not just an experiential moment of mismatch. Rather, with such a lens, multiple levels of dialogic rhythm become apparent, each of which, as well as the interaction of which, constructs a wash of heterogeneous affective possibilities and meanings (p.424).

An example from the sessions that exemplifies rhythm's intricate link to the body and to meaning making can be found in Christina's response to Improvisation #7, in which she shifts to polyrhythmic moaning, followed by the abrupt end of the music. Christina stated: "At first, I didn't know where this was going, but it was really something when I lost my voice – I felt like I was being strangled in my throat. I couldn't get anything out. (…) It's very significant, because that's my voice, and that's my words there. That's good - I knew that that's where it was, in my body" (Session notes, 4/6/02).

Rhythm's link to culture

In terms of the idea of a "wider ecology," culture has to be examined as an important factor. Rhythms are deeply embedded in culture, and are often the embodiment

of cultural rituals and values. If we think of a lullaby, for example, the 3/4 or 6/8 meter has the powerful association of a primary caregiver's rocking motion, or a swaying from side to side, which has important bi-directional co-regulation properties. The off-beat syncopations of a Brazilian samba, invoked by Knoblauch (2011), carry with them a light, relaxed feel "of strolling down the street" (p.419). Similarly, the rhythms and meters initiated by a client in a music therapy context bring with them a wealth of information and widen the scope from just the two participants to their cultural and religious backgrounds.

Some of the improvisations of this study had a ritualistic feeling to them. After an improvisation in Session #4, for example, Christina describes the feeling of the music as "old, tribe-like." "When we were playing, I got the image of a tribe, of some kind of rite, a thing that I had to do… It made it feel more grounded to me to have it in the context of a rite, an initiation rite maybe" (Notes from session, 12/1/01).

Loose mid-range co-ordination, shifts in mental states, and the "optimal arousal zone"

This study found evidence for the type of loose mid-range coordination described by Beebe et al. (2010). Since Beebe's studies as well as the study of Jaffe et al. (2001) were conducted on non-periodic interpersonal rhythms, it makes sense that their findings indicate a matching of dialogic interaction rather than a matching of tempo or literal rhythms. As we have seen, musical improvisation comprises both periodic and non-periodic rhythms, as well as a-rhythmic sections, and thus, the current study showed both mirroring and matching of actual rhythms as well as matching of rhythmic gestalts.

I hypothesized that mental shifts could be tracked through shifts in interpersonal rhythms as measured by the four IAP scales of tension, variability, salience, and autonomy. Thus, interpersonal rhythms that fell outside the "window of tolerance" indicated either hypoarousal or hyperarousal.

According to the IAP profiles, hypoaroused rhythms would have the following characteristics: first, they would be hypotense, indicating that rhythm does not influence the tension in the music. Then, they would be rigid regarding their variability, characterized by persistent, meaningless repetition. In terms of salience, rhythm would be dependent upon and overpowered by other elements. Concerning the role relationship between the improvisers, I posited that the client would take the dependent role, having no own musical identity, and synchronizing with the therapist's rhythms. On the other end of the spectrum, hyperaroused rhythms would be hypertense, to sustain unrelenting states of tension, and they would be random in terms of variability, with fragmented, discontinuous, or distorted characteristics. In terms of salience, these rhythms would be so prominent as to obliterate all other musical elements. Interpersonally, the client would take on the role of resister, focusing exclusively on her own rhythms, with complete disregard for the other improviser's rhythms.

The fact that very few of the ratings were in these two categories indicate that in this particular case, musical improvisation helped Christina to inhabit mental states in which she was usually neither hyper- nor hypoaroused. This stands in contrast to her presentation in some of the verbal parts of the sessions, in which she seemed to be on the verge of hyperarousal. However, she is also representative of a high-functioning client

group, with existing internal resources. She also had a significant history of using music-making for self-expression and self-regulation.

To most clinicians, it makes intuitive sense that shifts in intra- or interpersonal rhythms coincide with shifts in mental states. It is a complex task to analyze exactly how these two factors are related. This phenomenological study described the ways in which these shifts occurred. It was not possible, however, to find a direct causal link between loose midrange coordination and the state of "optimal arousal," although they did occur simultaneously on several occasions. As Beebe (2004) eloquently states:

> The variety of forms of implicit nonverbal intersubjectivity, including matching, difference, and their subtle intertwinings, patterns of self-and interactive regulation and their balance, and patterns of distress regulation, are many, difficult to catalogue, and probably unique to each psychoanalytic pair. Nevertheless we urgently need to study them. Interactions in the nonverbal and implicit modes are rapid, subtle, co-constructed, and generally out of awareness. And yet they profoundly affect moment-to-moment communication and the affective climate. They organize modes of relating, Stern's (1985) "ways of being with." Implicit, procedural, and emotional memories organize transference expectations and provide a degree of continuity and emotional functioning from childhood to adulthood (Clyman, 1991; Grigsby and Hartlaub, 1994; Sorter, 1994; Bucci, 1997; Stern et al., 1998; Lyons-Ruth, 1999; Knoblauch, 2000). Critical aspects of therapeutic action occur in this implicit mode, may never be verbalized, and yet they powerfully organize the analysis. The collaborative participation of the analyst in this process is an essential, but little-explored arena. We can teach ourselves to observe these implicit and nonverbal interactions simultaneously in ourselves and in our patients and thus expand our own awareness and, where useful, that of our patients (p.47-48).

Rhythm's linking function in transitional space

I would like to underscore three aspects of Winnicott's concept of transitional phenomena that are important to this study. First is its function as a resting place, an intermediate area between inner and outer worlds. Winnicott (1953) writes:

> It is assumed here that the task of reality-acceptance is never completed, that no human being is free from the strain of relating inner and outer reality, and that relief from this strain is provided by an intermediate area of experience (…), which is not challenged (arts, religion, etc.). This intermediate area is in direct continuity with the play area of the small child who is 'lost' in play (p.13).

Although the space created during a musical improvisation is not anxiety-free in the sense that internal judgments (e.g. on the quality of the music one is producing) cannot always be completely banned, it is a space that aims at bridging inner and outer realities without the strain of clearly having to delineate where the music is coming from or what it "means" in reality. It is co-created in the moment by the two participants.

The second important aspect of transitional phenomena concerns their temporal and intersubjective dimensions, specifically the dimension of experienc*ing*. Winnicott (1953) states that the transitional object "gives room for the process of becoming able to accept difference and similarity" (p.6). In rhythmic terms, the potential space created by the transitional phenomenon of music enables the previously described process of negotiating separation and connection, of being in the "groove" and being outside of it, within an *interpersonal context in time.* As we have seen, the new rhythms that are created in contexts such as the one of this study allow both participants to connect in a visceral, kinesthetic, musical way. The experience of "I can be in rhythm with others" can on just such a visceral and kinesthetic level be connected to past experiences with others in which similar "good enough" interpersonal rhythmic experiences occurred. Thus, "good enough" object relations that get summoned in a "good enough" here-and-now rhythmic interaction foster the hope that future good enough interpersonal interactions are possible.

Knoblauch (2011) explains the flip side of this idea as follows:

> What fills this space speaks not with words, of course, but with *new timing* (italics in original) that allows memories and feelings resonating the presence and the past, in which anger and pain is caused by confusion of caregivers who did not respond or support in a good-enough, rhythmically reliable enough, way, can have a place in present time and space to be named and felt (p.422).

Thus, it is possible to both access past traumatic experiences and rhythmic ruptures on a visceral, emotional, kinesthetic level, as well as to create new, good enough experiences that are reparative.

Transitional phenomena, effortlessness, and the "third"

By directing our attention to the effortless quality that characterizes the movement between internal and external realms, Benjamin (2002) highlights the third aspect of Winnicott's concept of transitional phenomena that is most pertinent to this study. "Through attuning, and entuning (an entrainment to tuning in) occurs so that the system now works in a more effortless way" (Benjamin, 2002, p. 47). She thinks about the relationship between mutuality and agency in this context, and speaks of a "sense of flow or freedom that goes beyond agency" (p.47). Thus, we not only have the effortless quality of transitional phenomena, but also the creation of something that goes beyond the sum of the two parts.

Benjamin (2002) expands these ideas into her concept of "thirdness, the creation of something that no longer identifiably emanates from one person or the other but mediates between them" (p.46). She cites the work of Beebe and Lachman (1988), who maintain that rather than striving to directly match each other, both participants in a dyad seem to align with a pattern or direction. Benjamin likens thirdness to

> following a shared theme in musical improvisation. (…) I see the third as something like the rhythmic structure or pattern that two or more partners

> simultaneously create and surrender to. Like transitional experience, it has the paradoxical quality of being invented and discovered. As in musical improvisation, there can be surprises, but there is a key and a rhythmicity; patterns can change but not arbitrarily" (p. 48)

This idea deeply resonated with me as I analyzed the transcriptions of the improvisations. Often, the organization and patterned interaction of the music we produced seemed pre-composed in a way. How could it be that we made this up as we went along? But therein lies the power of music, the power of rhythm in the interaction between people. When you are "in the flow," there is the sense that the music is playing you rather than that you are playing it. You are inventing it and discovering it at the same time, in interaction with another or with several others. And yet, the ability to know what to expect within certain parameters makes it safe enough. Even though improvised music is not always in a key, as Benjamin states, and even though there can be periods of poly- and a-rhythmicity, our ability to form rhythmic and interpersonal expectations allows us to play, and to experiment with separation and interconnection.

The development of the musical relationship over time also owes much to the idea of the "third." Although the level of bi-directional co-regulation, and optimal arousal states made possible by loose midrange coordination is crucial and also has its own developmental trajectory, there is a level in the interpersonal interaction that goes beyond these factors. If one compares one of the first improvisations analyzed in this study with one towards the end of the treatment, one gets a sense of an increased effortlessness in terms of mutuality. Knowing each other's rhythmic tropes and gestures, one's musical sense of humor, and a sense of increased trust all impact the ability to enter into this

transitional space, to be open to each other and to oneself, and to do the work that needs to be done.

Clinical Implications of the Current Findings

The results of this study demonstrate that closely attending to interpersonal rhythms in music therapy presents an additional level of assessing and understanding traumatic experience. As an assessment tool, using IAP-assisted microanalysis can be useful to music therapists in assessing the level of trauma, which finds its expression in rhythms of hypo- and hyperarousal. Rhythmically aware, embodied listening and experiencing can also be applied to verbal psychotherapy practice.

Implications for verbal treatment

Clinicians can use a nuanced attunement to rhythms on two levels. First, on a conscious level, the clinician's awareness of her vocal rhythms can include when something is said as well as the timing and rhythmicity of vocalizations (such as "mh," or "uh-huh"). When dealing with a client with a trauma history, these elements are especially important in creating an environment with high predictability. It has to be emphasized again, however, that too close vocal tracking is not advisable; it can be read as a sign of the clinician's anxiety, or, less consciously, lead to a lack of flexibility in the interaction.

Rhythmic attunement can also aid in finding new ways to retrospectively understand unconscious aspects of disruptions in intrapsychic and interpersonal rhythms in both analyst and patient. These ruptures carry complex transference and

countertransference implications that are likely unique to the therapeutic dyad. However, it may be possible to delineate some of the rhythmic characteristics that distinguish traumatic ruptures in rhythm from non-traumatic disruptions.

This study focused mainly on non-traumatic rhythmic disruptions such as polyrhythm, syncopation, and a-rhythmic sections within larger rhythmic structures. A common element of these disruptions is that the underlying sense of relatedness was never annihilated. In musical terms, this is often expressed as an underlying pulse. As we have seen, even in non-periodic sections where there is no ongoing sense of pulse, it is possible to form rhythmic expectations. To some extent, this is also possible in a-rhythmic sections, where the frame of the musical improvisation supplies a container of sorts.

In traumatic rhythmic ruptures, there is no sense of relatedness, no sense of underlying pulse that is intentional or meaningful. Laub and Podell (1995) posit that trauma results in the erasure of a "primary empathic bond" (p.991) and in the loss of an "internal other," which finds its musical representation in notes that seem to "come out of no where and lead no where" (c.f. Sutton & DeBaker, 2009). Rhythm is repeated in a meaningless manner, with a sense of stuckness, of going on like an automaton, without intention, and without awareness of being engaged in an experience, with a listening, responding other. As Goldfine (2010) discussed, exact verbal repetition in trauma narratives can "indicate an especially high degree of psychological immersion in the trauma" (p. 111). Behaviorally, this can also take the form of a child who keeps crashing a toy airplane into a tower made out of blocks. In all of these examples, repetition does

not lead to a mastery of trauma because the person is likely in a state of hypo- or hyperarousal, in which there can be no processing.

Implications for music therapists

For the purposes of diagnostic assessment and to better understand the shifts in a client's mental states that occur in musical improvisations, the IAP profiles of tension, variability, salience, and autonomy may be useful in tracking whether and when a client shifts into hypo- or hyperarousal. Tony Wigram, a music therapist who has made extensive use of the IAPs in order to make differential diagnoses, indicates that the polarities of the scales should be used rarely. In my rating system, examples of such polarities on the autonomy scale would be the roles "dependent" and resister." Wigram (2007) states: "When working with strong pathologies, extreme gradients can be used, as they can provide quite relevant musical descriptors of pathological behavior or characteristics" (p.213).

In my clinical experience as a music therapist, the types of rhythms I described in the categories of hypo- or hyperarousal would mainly be found in highly traumatized populations, such as inpatient psychiatric adults. A music therapist's increased awareness of when and how a client falls into one of those dysregulated states can help her tailor musical interventions to facilitate shifts back into the "optimal arousal state." It might even be possible to help the client understand their own arousal states better, to tie this understanding to psychoeducation on the psychological effects of trauma, and to help the client develop practical music-based tools for self-regulation.

Limitations and Directions for Future Research

While the results of this study carry interesting implications for clinicians working with traumatized populations, a few limiting factors should be considered. First, the case study was based on data from a treatment comprising just 12 sessions, only 9 of which were available in audio format. Although the 9 sessions were deemed an adequate sample, due to their temporal location within the treatment, and because they captured key moments in the work, analyzing the remaining 3 sessions might have brought additional rhythmic interactions to light. Also, the relatively short time frame of the treatment made it difficult to analyze over-time effects. Furthermore, the fact that Christina had a musical background and was in the higher functioning range made it less likely for traumatic rhythmic ruptures to occur in the improvisations. Finally, her traumatic experiences occurred mainly in childhood, with a few difficult events in early adulthood. Due to confidentiality concerns, the exact nature of some of her traumatic experiences could not be discussed. Had her exposure to trauma been more recent, the rhythmic ruptures in the improvisations may have been more pronounced and of a different type. Although 9/11, a major large-scale traumatic event, occurred just a month before our first session, it is not possible to say how that may have influenced the improvisations.

It would have been interesting to compare Christina's non-periodic verbal rhythms and our verbal interaction to the rhythms tracked in the music. Of special interest would be whether there were any carry-over effects into the verbal realm over time, that is, whether her ability to be in the "optimal arousal state" would have increased in spoken dialogue. Unfortunately, that would have transcended the scope of this study.

The choice of the IAP profiles to track shifts in mental states were based on my estimation of their usefulness for this task. Since the focus of this study was on rhythm, this was the only musical element that was tracked. Future studies may include other musical elements to gain a more nuanced view of what is happening in the music. It may be of particular interest to track volume and phrasing as well as rhythm, and perhaps also to distinguish between rhythmic ground, and rhythmic figures. Adding these elements may get closer to a description of what Stern (1985) has called "vitality affects," and what Pavlicevic (2000) conceptualizes as "Dynamic Form."

Coda

> The 'rhythm' that is the object of so many judicious studies and of so much diligent research and that rhythm, which, like poetry and language, opposes conceptual thought with an unrelenting mystery – the recorded, defined, measurable rhythm, and the living, experienced, ungraspable rhythm – could these two rhythms have the same essence? (Abraham, 1995, p. 67)

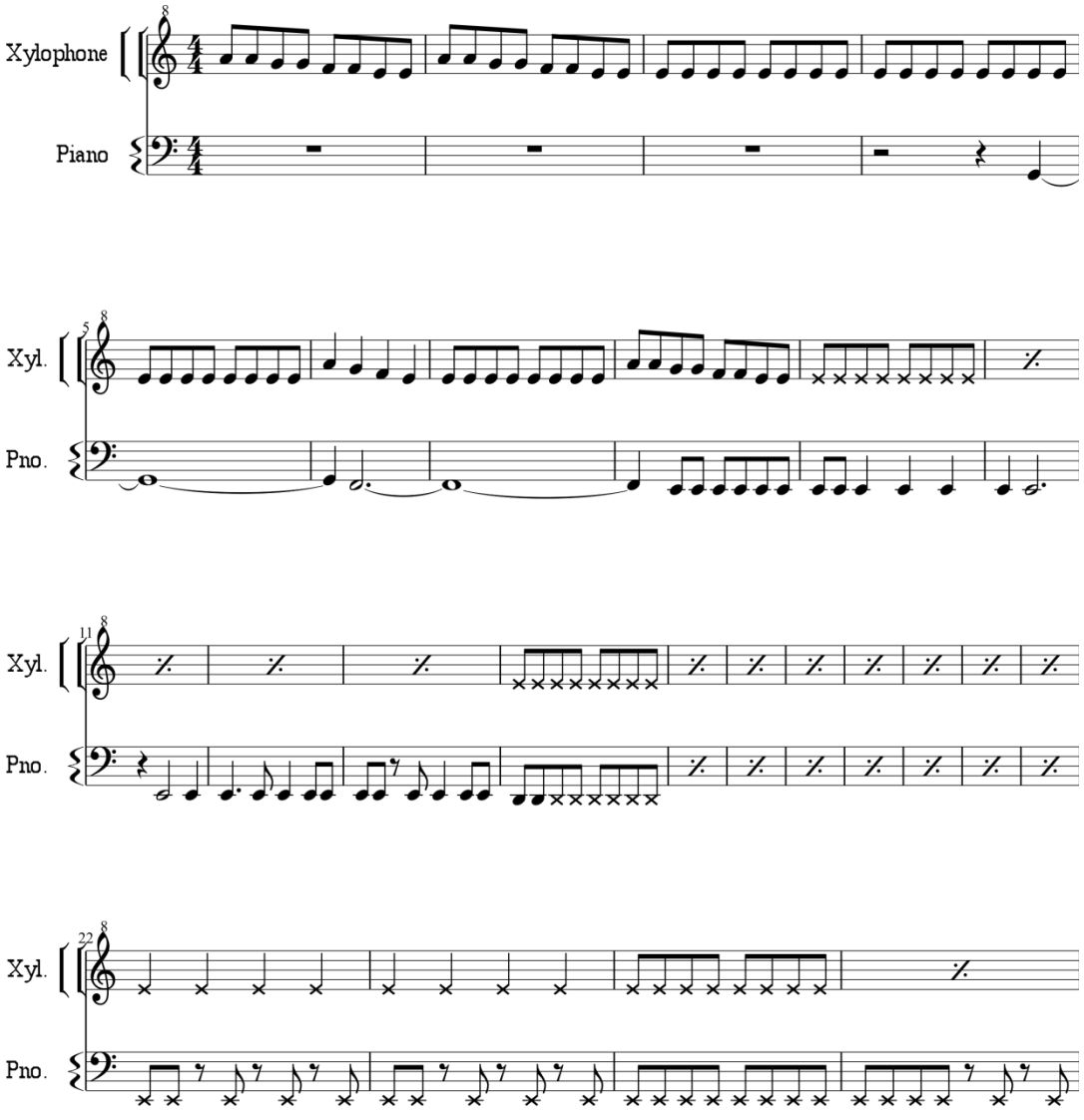
I began this project with some trepidation. Very much attuned to the difficulty of translation – translating different parts of myself in different cultural contexts, translating what happens in a musical interaction in words, translating insights from my music therapist self to my burgeoning psychoanalytic self – I wondered whether it would be possible to subject what once was a lived musical experience to scientific investigation without sacrificing it's essence, and without losing a whole dimension. Now, I can answer Abraham's question with a resounding yes. The microanalysis of the improvisations which Christina and I engaged in uncovered layers which I could scientifically study while at the same time preserving and even deepening the awe and passion that I feel for this form of interaction.

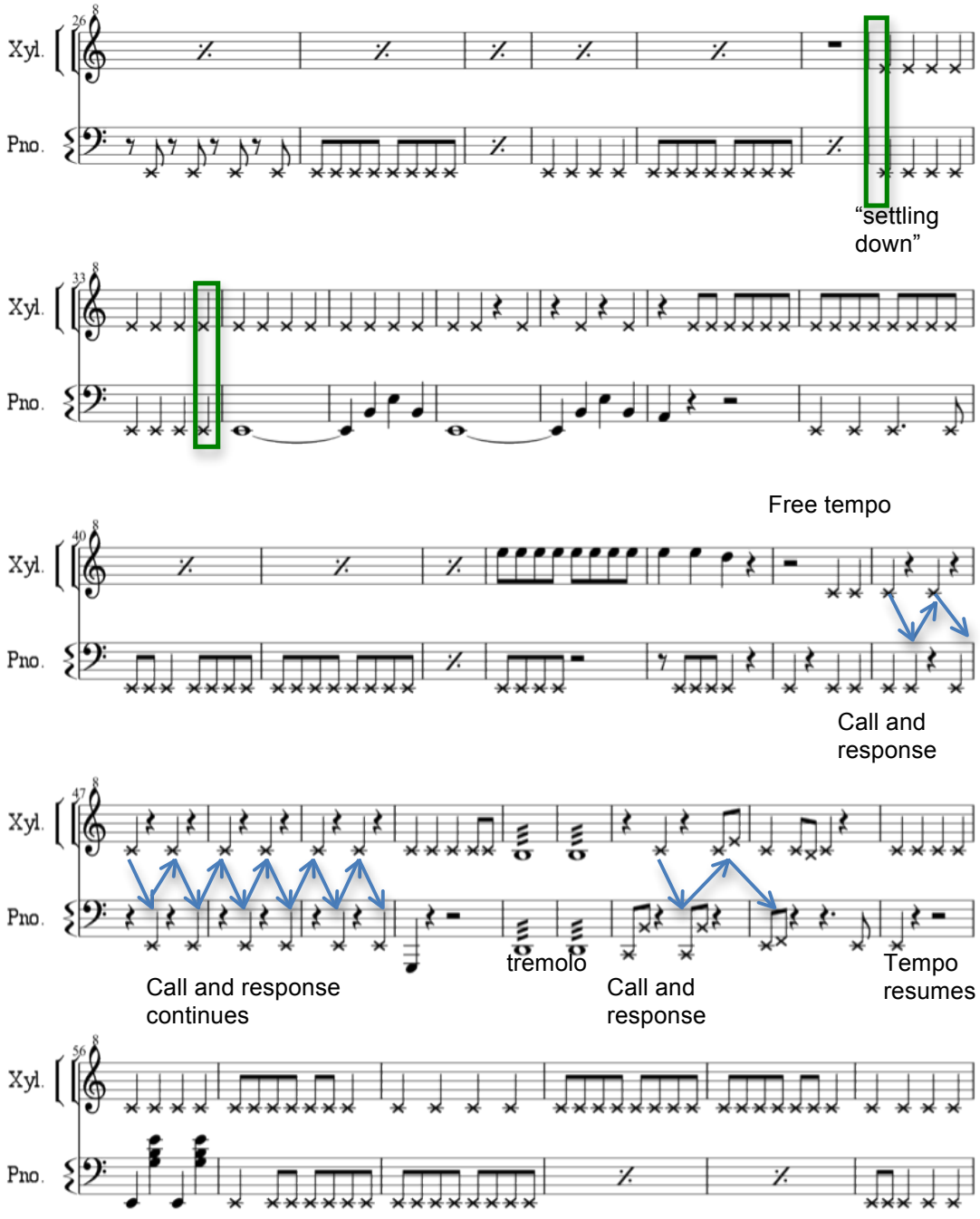
This study set out to explore whether and how musical improvisation facilitates the repair of ruptures in interpersonal rhythms that result from a history of trauma. It was found that this goal can be realized through music's ability to facilitate bi-directional co-regulation and an "optimal state of arousal," and through the music therapist's ability to engage in loose midrange coordination with a client on a visceral, and kinesthetic level. However, music's function as a transitional phenomenon adds an intermediate, "third" area of experiencing, in which patterns of interaction emerge that go beyond the dyad, and in which the cultural background of each participant comes out to play. Finally, the crucial importance of making space for disruptions and ruptures, in order to learn about them and from them, was discovered in the syncopations, polyrhythms, and a-rhythmic moments within improvised music, this marvelous art form.

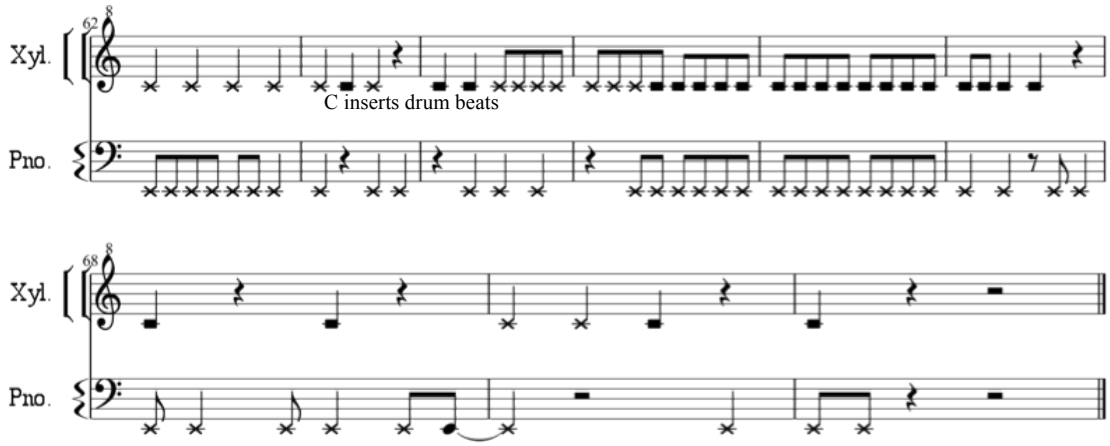
Appendix

Transcriptions of selected improvisations

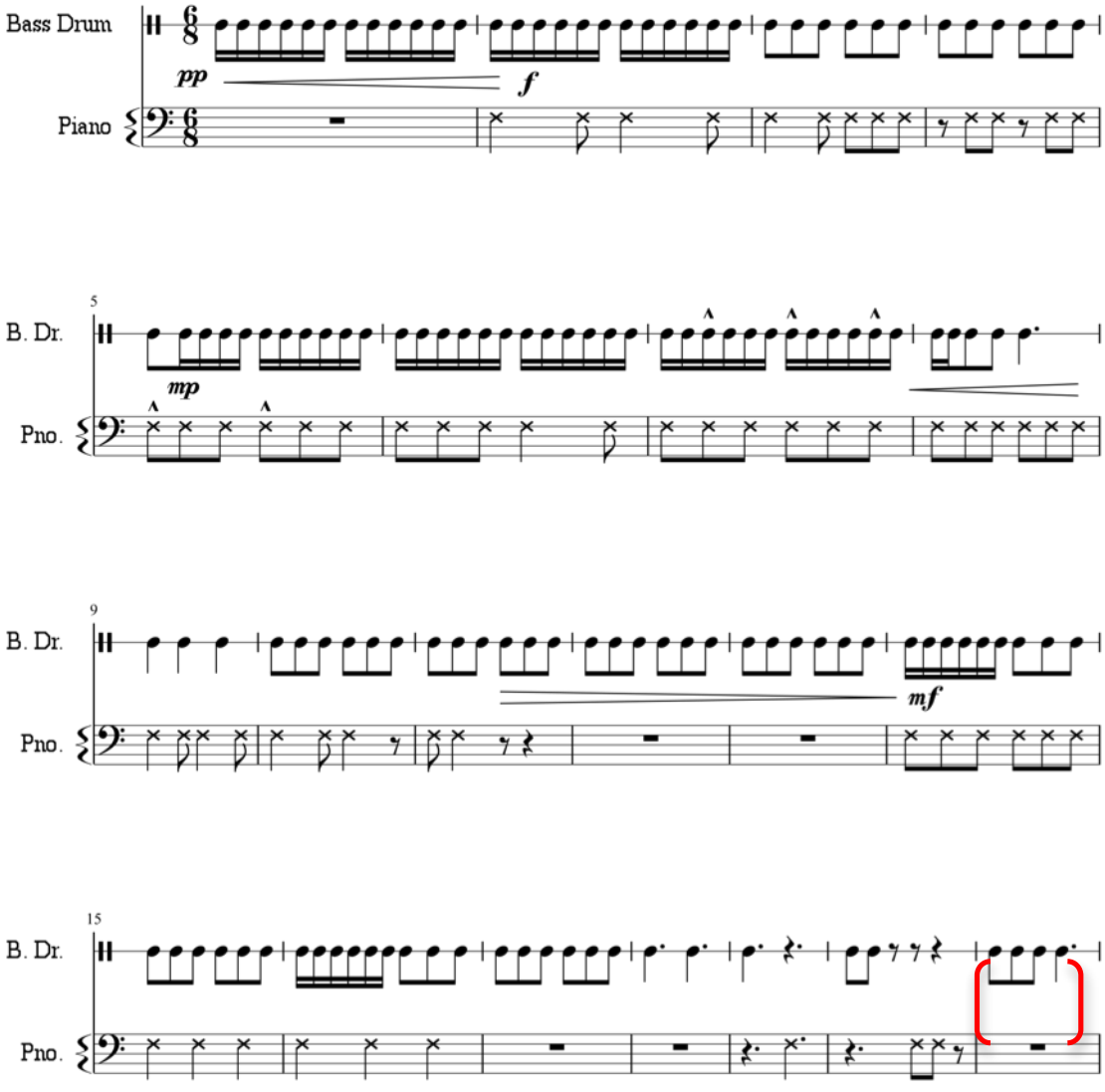
Session 5 Improv 5

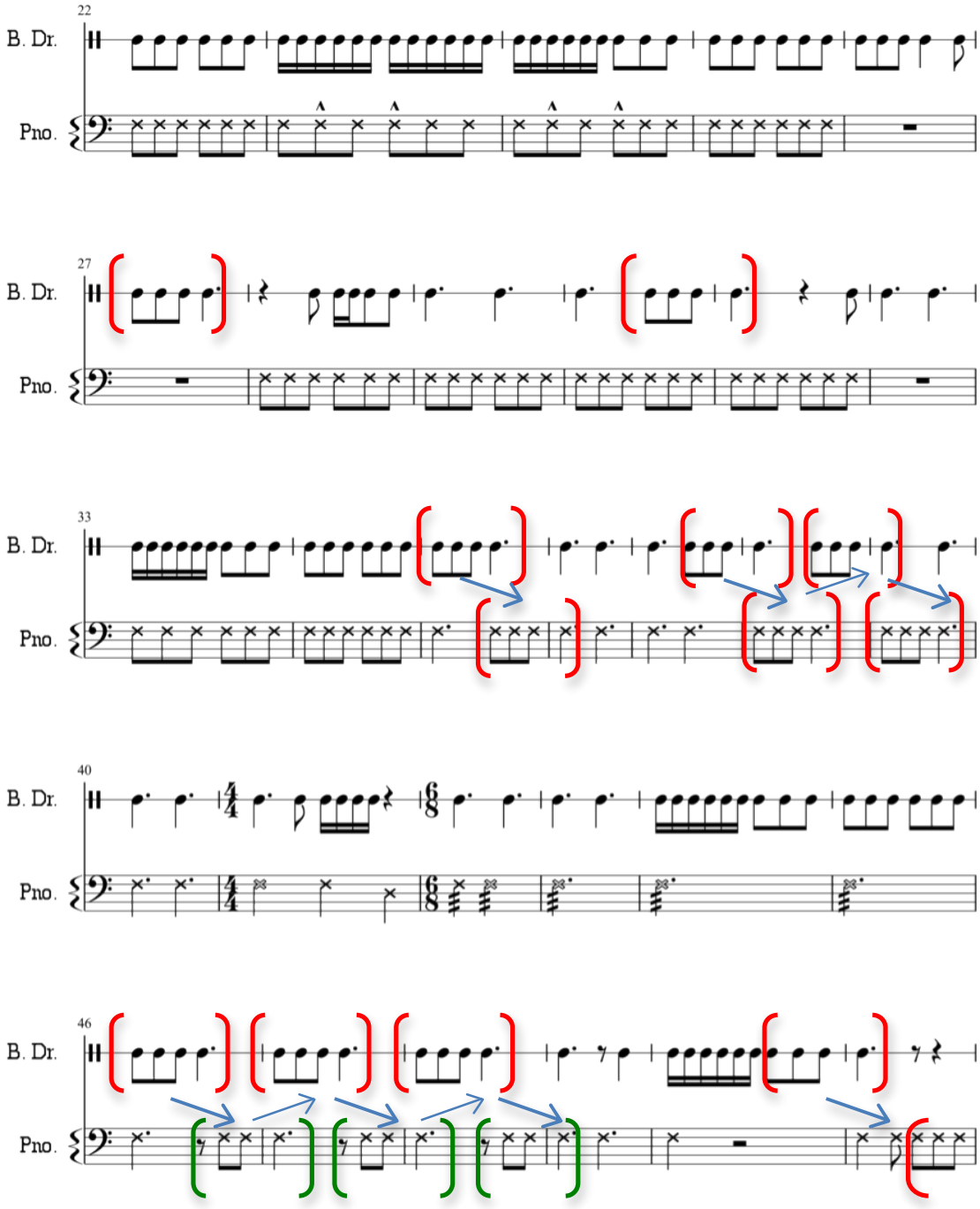


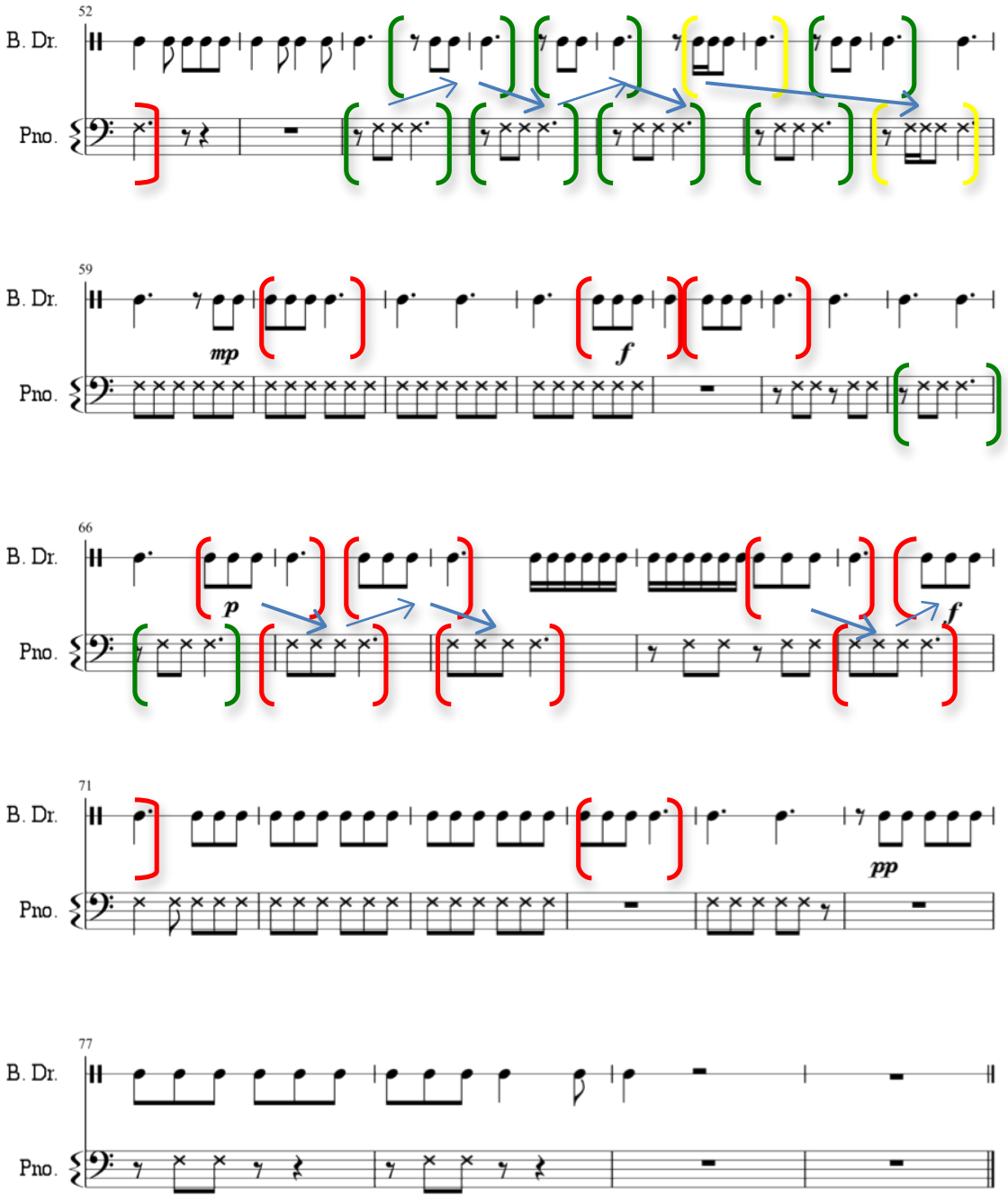

Xyl.
Pno.
26
"settling down"
33
Free tempo
40
Call and response
47
Call and response continues
tremolo
Call and response
Tempo resumes
56


62
Xyl.
C inserts drum beats
Pno.
68
Xyl.
Pno.

Session 7 Improv 7

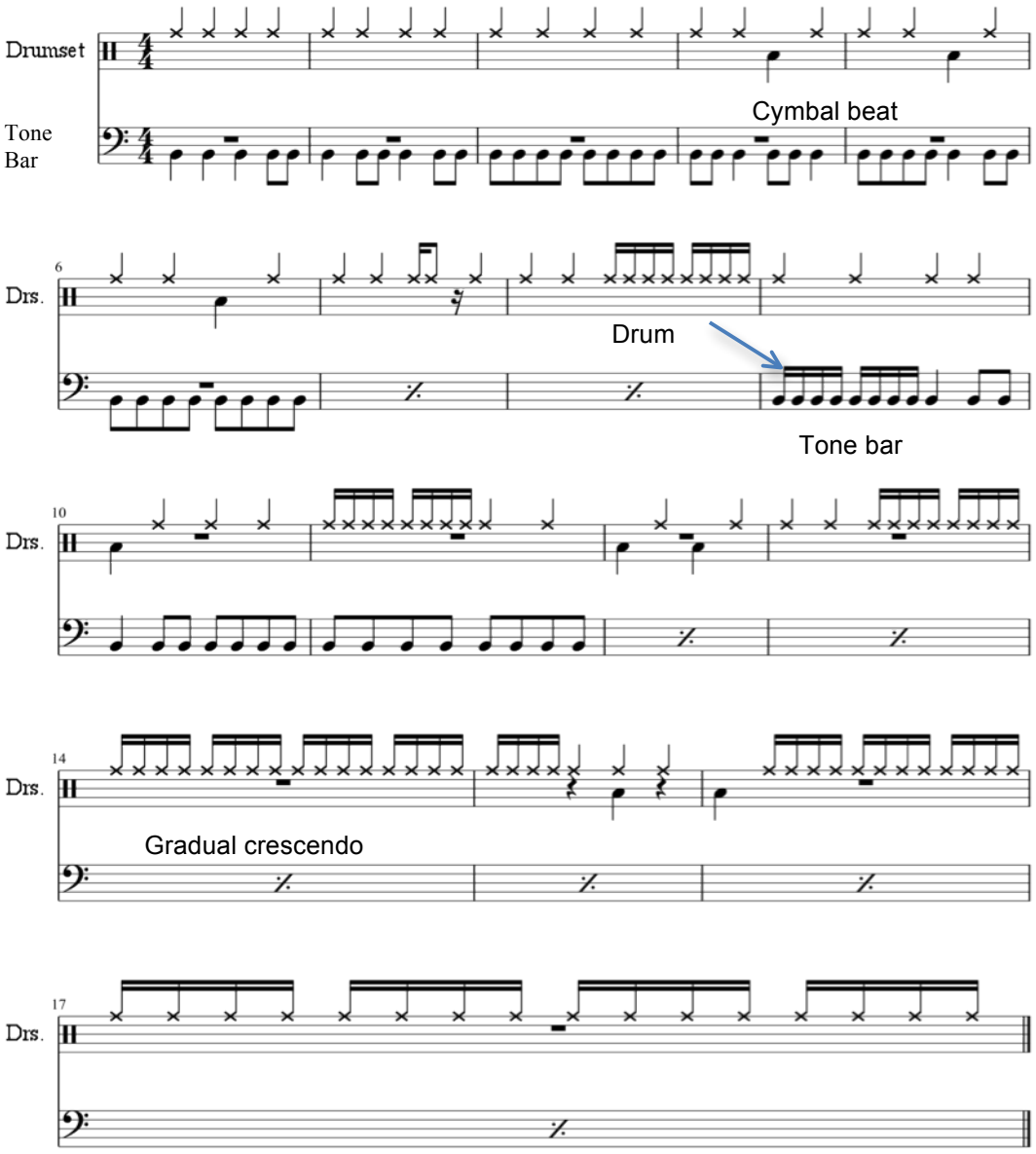



22
B. Dr.
Pno.
27
B. Dr.
Pno.
33
B. Dr.
Pno.
40
B. Dr.
Pno.
46
B. Dr.
Pno.


52
B. Dr.
Pno.
59
B. Dr.
mp
f
Pno.
66
B. Dr.
p
f
Pno.
71
B. Dr.
pp
Pno.
77
B. Dr.
Pno.

Session 10 Improv 1 Part 1

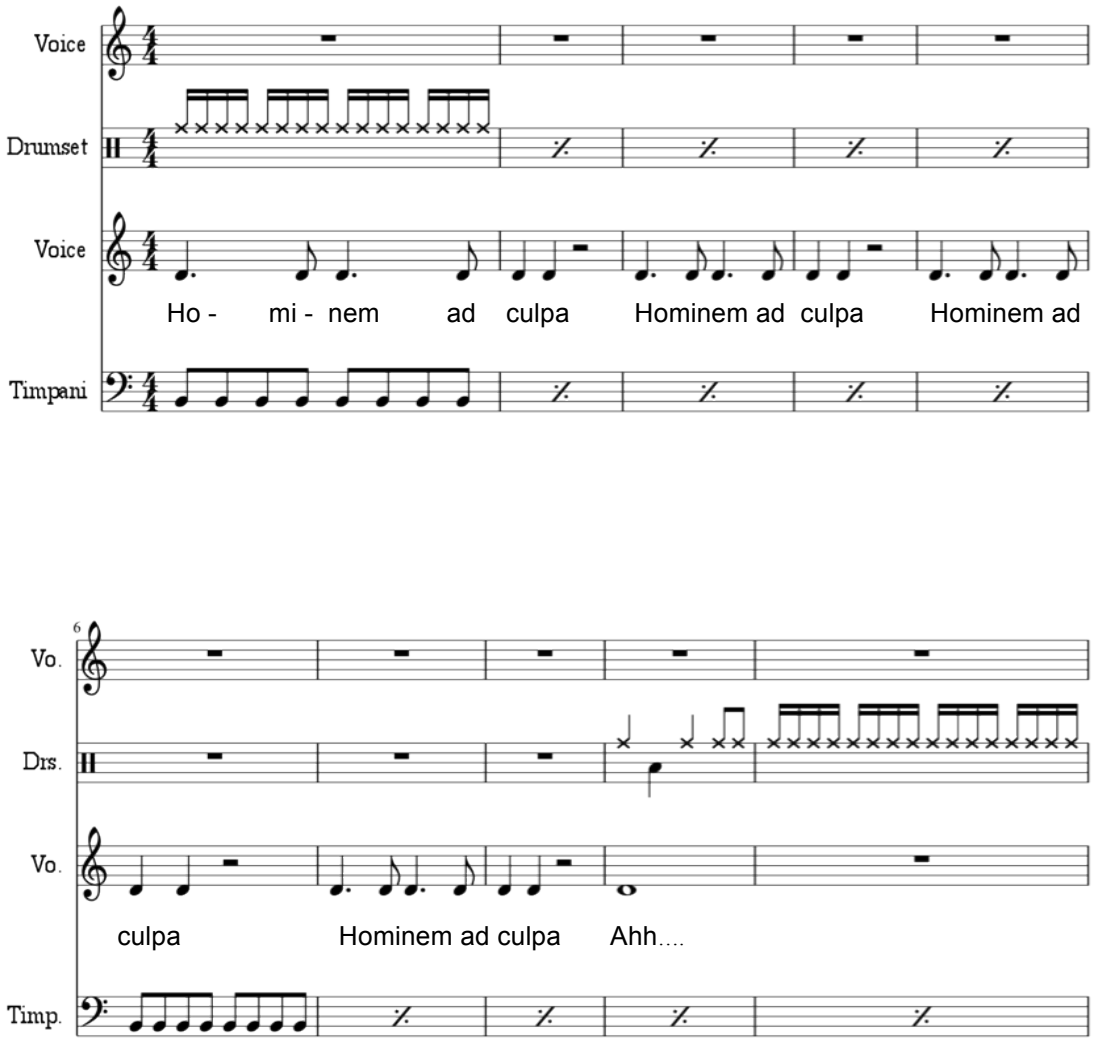
Christina plays the drums and cymbal, I play the tone bar.



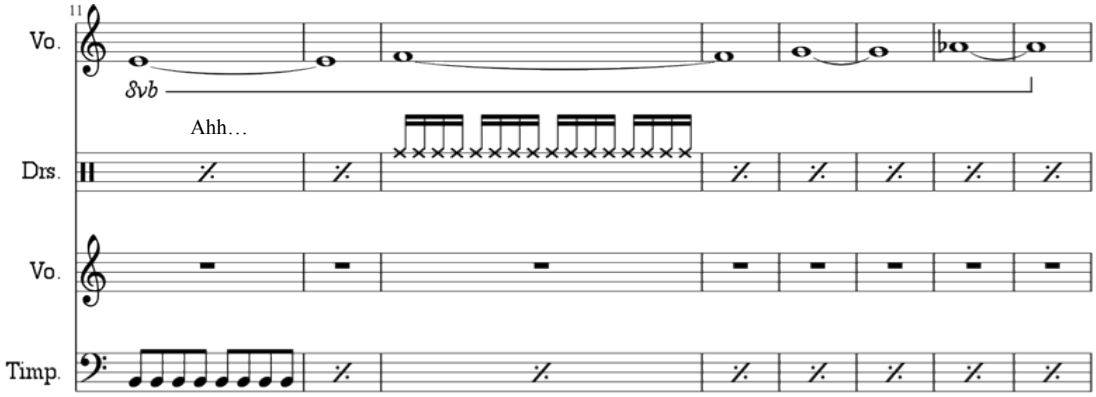
Piece continues with Part Two

Session 10 Improv 12 Part 2

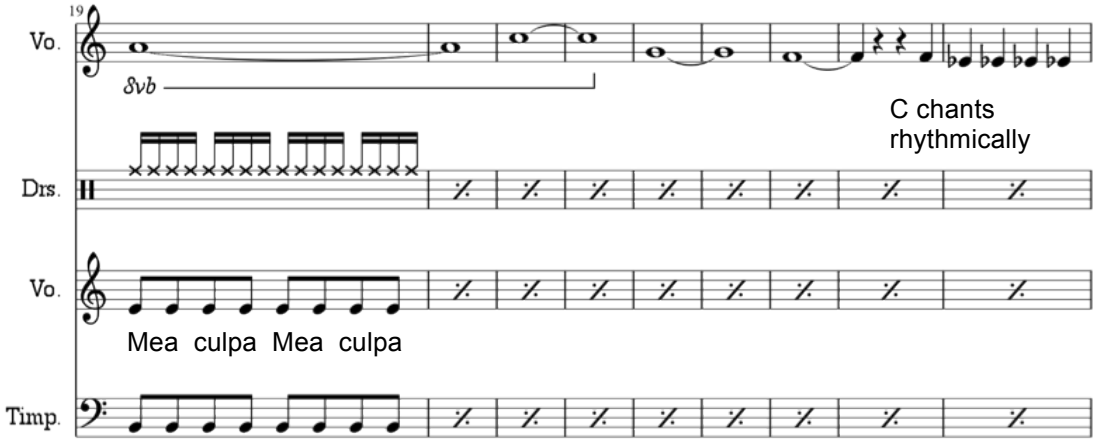
In this section, I start chanting made up words in Latin.



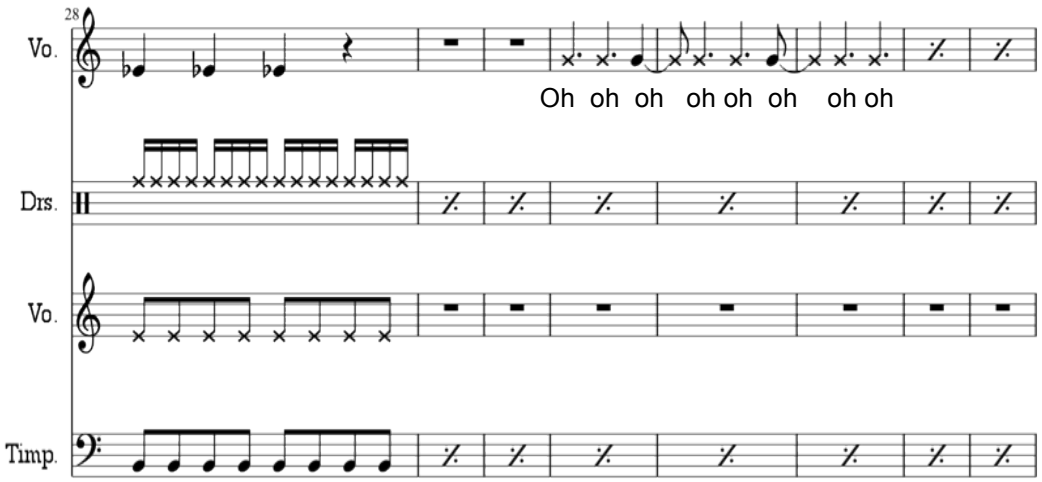
Here, Christina starts chanting on an open vowel.



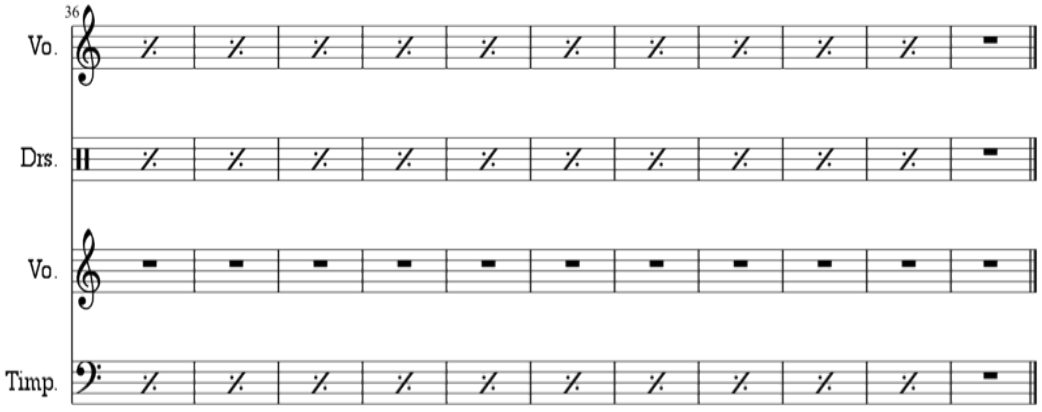
I begin to chant “mea culpa,” rhythmically, while Christina continues to sing “Ahh.”



C. starts polyrhythmic chant.



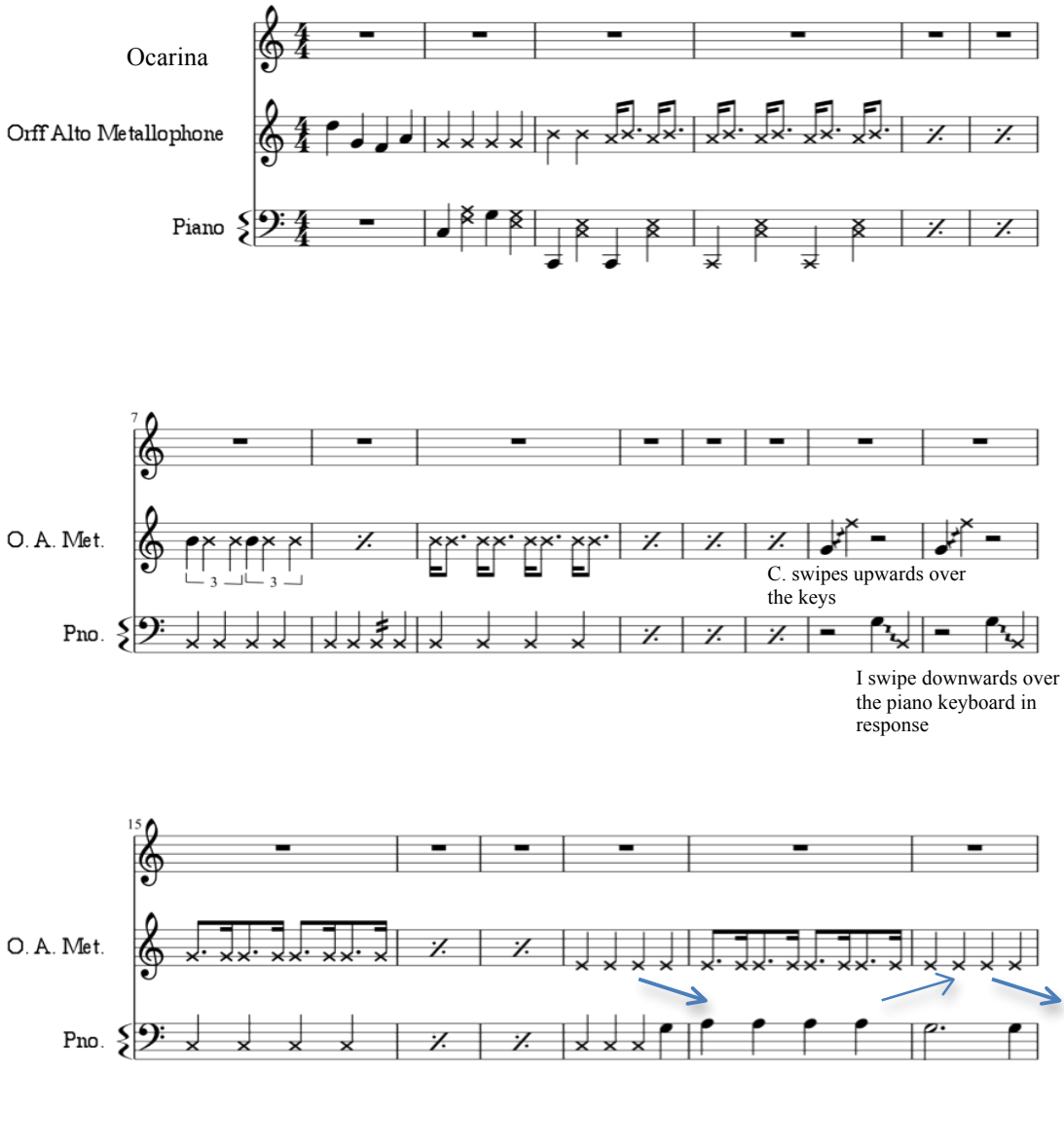
3 bar polyrhythm is repeated four times.

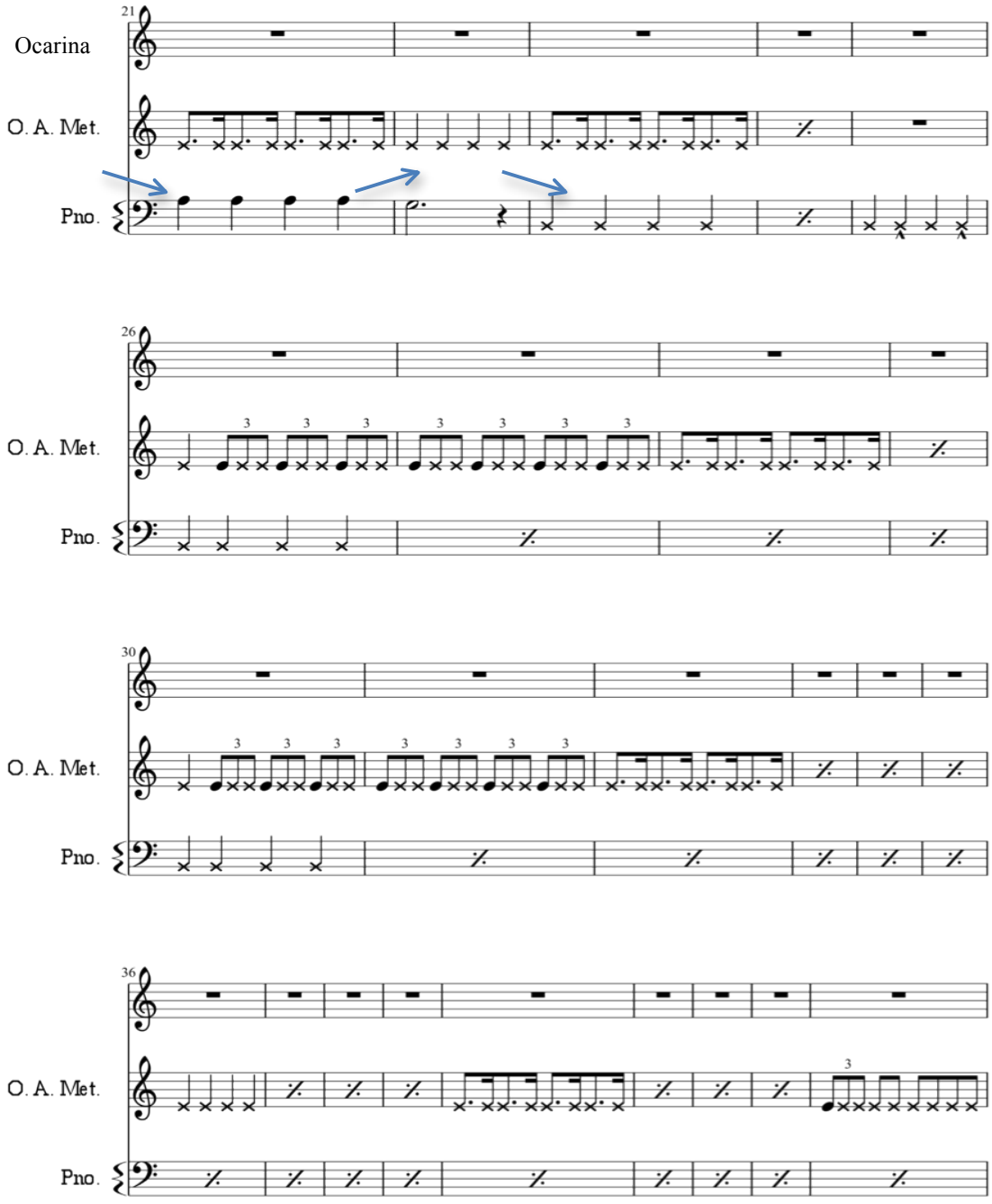


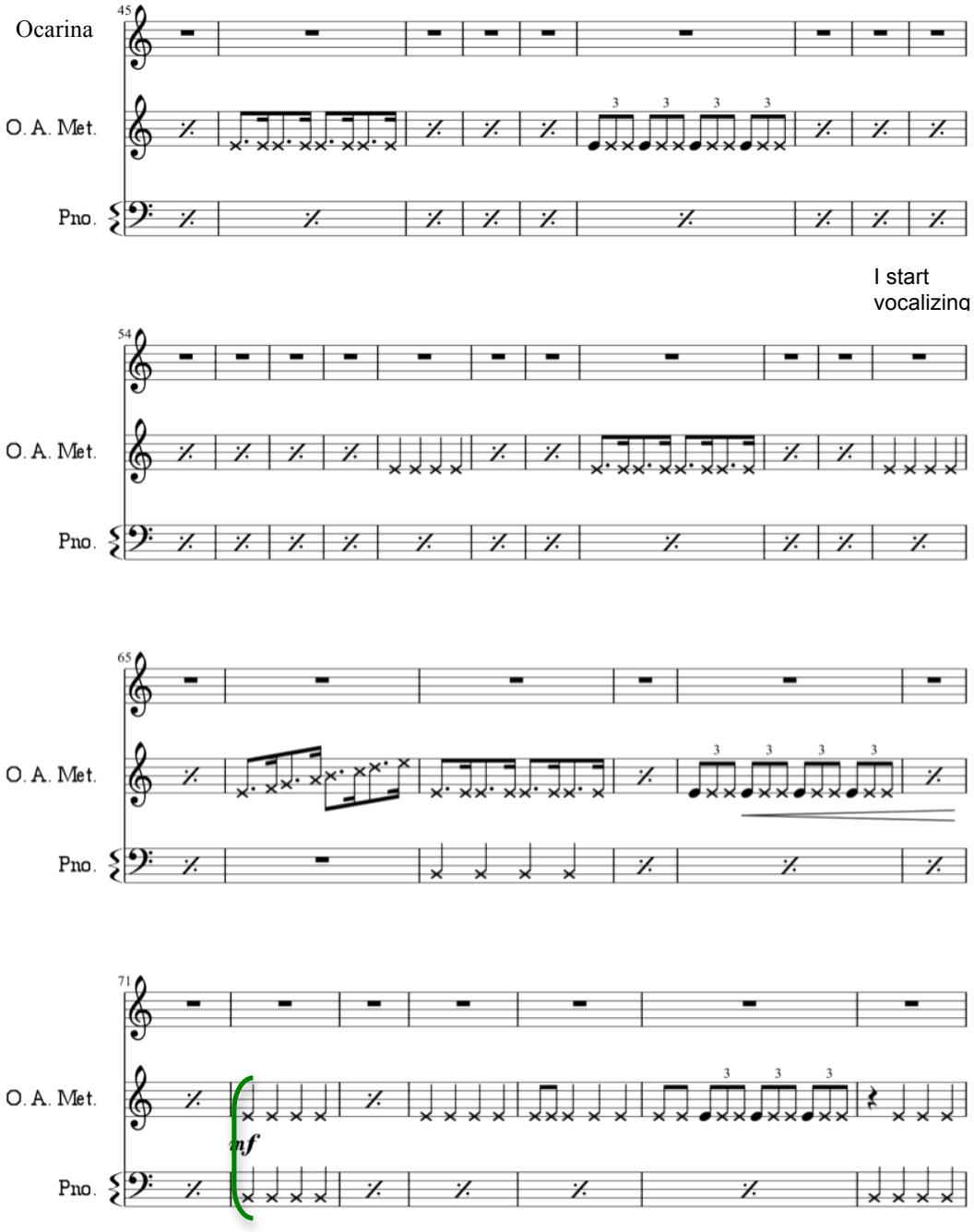
Music fades out and ends.

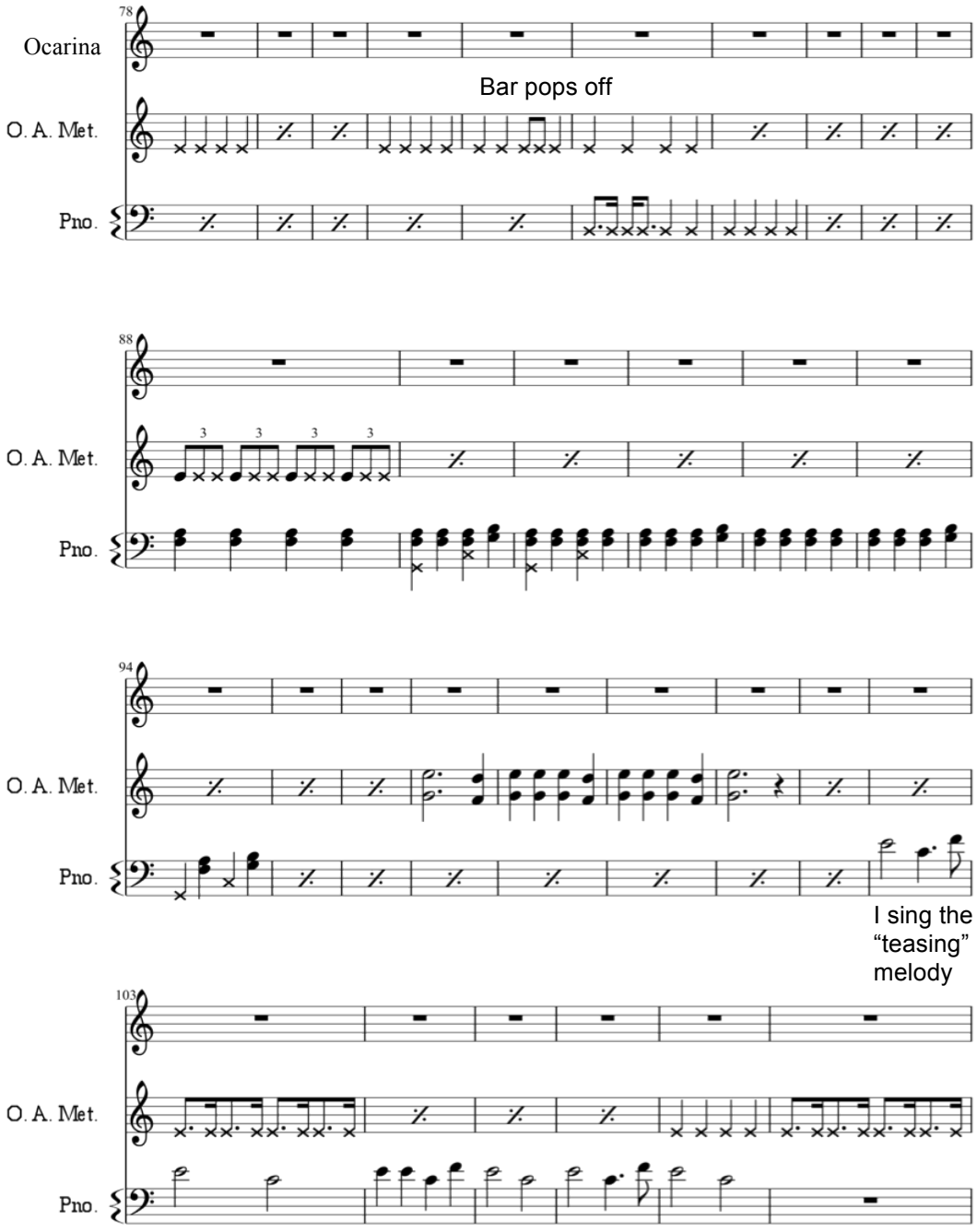
Session 11 Improv 16

Christina begins playing the metallophone, and I accompany her on the piano. Transcription starts as the music develops a regular rhythm.

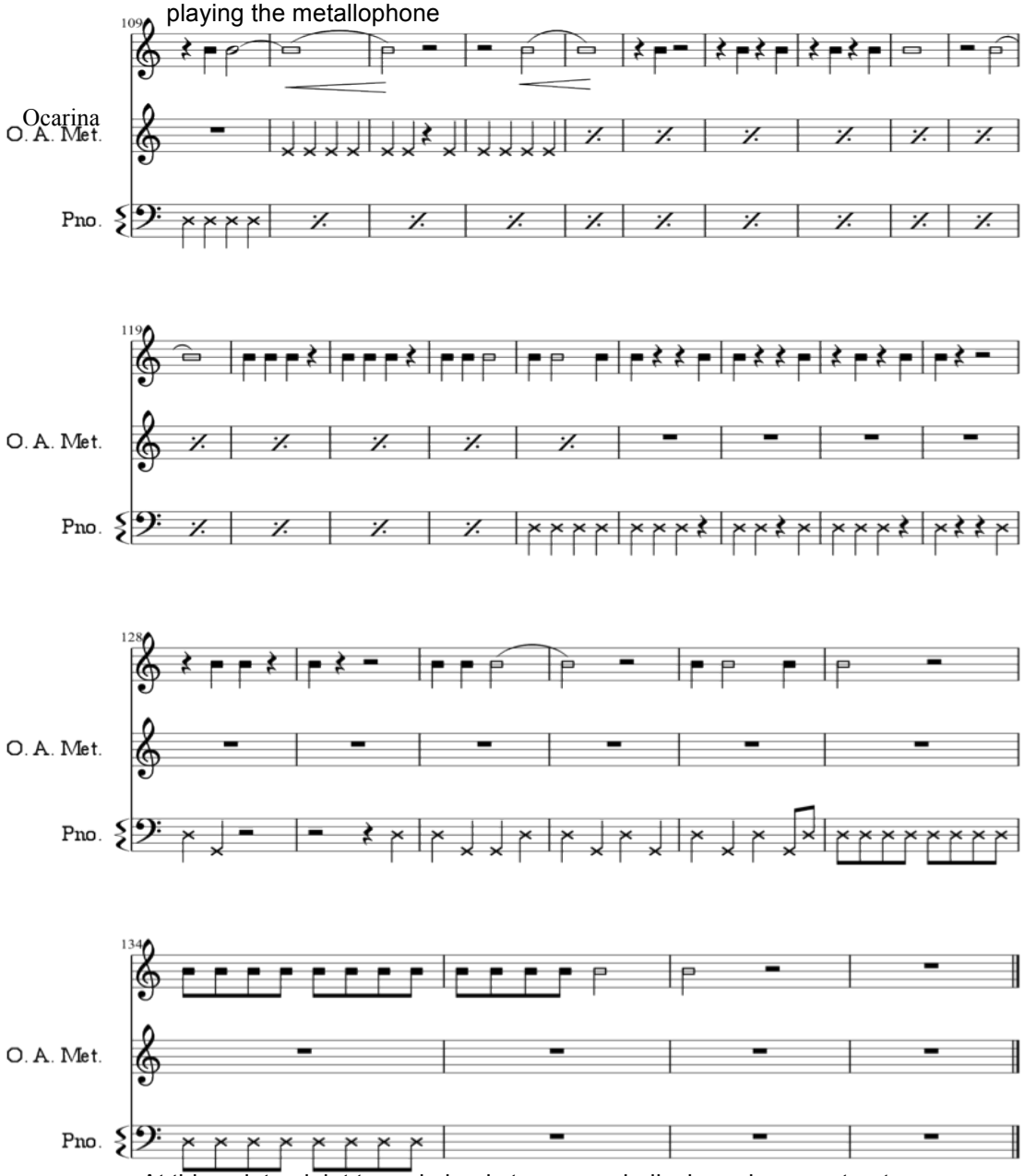



21
Ocarina
O. A. Met.
Pno.
26
O. A. Met.
Pno.
30
O. A. Met.
Pno.
36
O. A. Met.
Pno.


Ocarina
O. A. Met.
Pno.
45
I start vocalizing
54
65
71
mf


78
Ocarina
Bar pops off
O. A. Met.
Pno.
88
O. A. Met.
Pno.
94
O. A. Met.
Pno.
I sing the
“teasing”
melody
103
O. A. Met.
Pno.

Christina begins to play notes on the ocarina in addition to playing the metallophone



At this point, a joint tremolo leads to non-periodic, long drawn out notes on the ocarina, accompanied by sustained, open chords on the piano. The music fades, and the improvisation ends.

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