The Pathway of Music Acculturation: A Duet between Parent and Infant

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Gerda Georgina Pretorius

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Supervisor: **Dr Matildie Thom Wium**

Co-supervisor: **Prof Caroline van Niekerk**

Statement of originality

I declare that the dissertation ‘The Pathway of Music Acculturation: A Duet between Parent and Infant’ hereby handed in for the qualification Magister Musicae at the University of the Free State, is my own independent work and that I have not previously submitted the same work for a qualification at/in another University/faculty.

Concession

I, Gerda Georgina Pretorius, do hereby concede copyright of this work to the University of the Free State on this day _____

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Dedication

I dedicate this study to my father and mother.

Acknowledgements

I wish to express my gratitude to the following:

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CHAPTER 1: Introduction

1.1 Rationale and theoretical framework

Researchers in the field of music education are investigating various topics in order to enhance understanding of musical development (Bowman, 2002; Gordon, 2003; Elliott, 2005; Green, 2005; Green, 2008), the understanding of the pedagogical approaches of music education (Myers, 2008; Ruthmann, 2008; Regelski, 2009), and the understanding of teaching approaches and learning techniques for the music classroom (Gordon, 2001; Gordon, 2003; Westerlund, 2003; Green, 2008). In contrast to this prolific output, a noticeably lesser body of literature has examined the role of parents in infants' musical development (Custodero & Johnson-Green, 2003; De Vries, 2009). A noteworthy insight, though, is the following:

> In view of the [rich musical] environment that mothers often provide, it is unclear whether [an infant] program is necessary or desirable in the first year of life. Nevertheless, more and more of these programs are appearing. Thus the time is ripe for considering their pros and cons and engaging in serious reflection on the musical activities that are appropriate for infants, toddlers and their parents (Trehub, 2005: 29).

An inference is made that, if mothers[1] are educated by way of new research on appropriate musical activities for their young children, they will be able to guide their children with confidence in a natural and economical family approach at home, which is mostly not the case at the moment (De Vries, 2009: 403; De Beer and Pretorius, 2011: 41). Mothers will be in the position to recognise that implicit in the bi-directional, everday event that follows, is an irreplaceable didactical approach for the musical nurturing of their infant:

> A mother and her young baby are playfully interacting. We hear the mother speak in short bursts, talking in an inviting sing-song manner, and the baby occasionally 'answers back' (Malloch, 1999/2000: 29).

[1] In this study, I refer to the mother as the primary caregiver within the context of my argument on the reciprocity between the infant and the primary caregiver as a dyadic construction. My usage of this concept is derived from the extensive literature on "*mother*-infant vocal play". My argument does not intend to disregard the crucial role of the father and other caregivers within the family context. The role of the father in the extended tryadic structure is referred to in Sections 2.4, 2.5 and 3.6 and the role of parents is addressed throughout the study.

Newborns are predisposed and motivated to take part in playful non-verbal conversation as portrayed above. However, the mother–infant vocal play, to which Sandra Trehub refers as 'musical activities that are appropriate', is not the frivolous experience that it might seem on the surface, but an intuitive interactive experience that carries critical developmental and learning outcomes.[2] Accordingly, this research proposes that the coordination of spontaneous and unstructured mother-infant-dialogue or 'vocal play' (Stern, 1977: 16; Jaffe et al., 2001: 3; Trevarthen, 2008: 17) is a precondition for early social relatedness[3] and cognition[4] as well as for the development of musicality as processes of music acculturation.[5]

I propose that vocal play could furthermore be supported and enriched by musical parental guidance in the home environment, structured around the notion of learning. Edwin Gordon advises that infants should daily absorb music of diverse tonalities, harmonies, metres, timbres and tempos (Gordon, 1997: 41; 2003: 11) in order to stimulate processes of audiation. According to Gordon (1997: 115) audiation is 'hearing and comprehending in one's mind the sound of music that is no longer or never has been physically present'. He explains the skill as follows:

> [P]retend that you are hearing a group of children singing *Happy Birthday*. If you can do that with a degree of precision, and if you understand some musical characteristics of the song, such as its tonality, meter, resting tone, beats, and the harmony implied by the melody, you are audiating at least to some extent. Audiation is to music what thought is to language (Gordon, 1997: 11).

[2] Development is commonly understood as a sequence of biological transformations that occur throughout life and learning the accumulation of knowledge as a result of environmental influence. Both processes contribute to cognitive development.

[3] Jaffe et al. (2001) found that vocal rhythm coordination during mother-infant interaction promotes feelings of empathy and social relatedness.

[4] Cognition in this context should not be understood as restricted to the passive perceiving of information (Serafine, 1984: 218), but also in its application in the contexts of experience, training, development and culture (Lehmann, 2002: 443). Cognition includes automatic, biological processes as well as processes that depend critically on social learning experiences (Thompson and Schellenberg, 2002: 461).

[5] Music acculturation is the foundational processes during which the infant listens to, absorbs, and responds to sounds of the (home) environment. At this stage the infant unconsciously gives syntax to music by organising melodic and rhythmic patterns of the culture, in order to create meaningful musical communication (Gordon, 1997: 32).

From an ethnomusicologal perspective, Ruth Finnegan (1989: 306-307) describes in her book *The Hidden Musicians* how musical pathways provide an 'invisible structure' through which people choose to express their daily musical experiences. I apply the metaphor of the pathway as invisible structure to the early reciprocal behaviour of mother and infant – the first musical experience, and crucial for the development of audiation skills. Moreover, I argue that it cannot be replaced by 'reproduced' (Papoušek, 1996a: 50) music or any marketable music programme. Thus, I suggest that the foundation of music learning is inseparable from intimate social processes that allow the infant to cooperate with a partner.

The proposed pathway model commences with certain inborn capacities for sound in the fifth month of gestation (Busnel and Granier-Deferre, cited in Laughlin, 1989: 142). In other words, music learning starts in the womb, a condition that compels Barrett (1998: 12) to remark: '[f]or the way the brain functions birth is a non-event'. Music learning progresses during the first months of life by way of coordinated experiences of primary intersubjectivity, a process during which the non-verbal actions of one partner comes to be predicted by that of the other (Beebe et al., 2003: 789). A shift occurs more or less at seven months, with experiences of secondary intersubjectivity during which the infant attunes to the feeling state of the mother, and coordinates with others as well as environmental objects by way of referential gestures (Stern, 1985/2000: 128; Beebe et al., 2003: 789).

Furthermore, the proposed pathway model challenges assumptions held on both sides of the nature/nurture debate, observable in an 'ecological transition' where the self, biology and culture all play formative roles (Barrett, 1998: 274). Thus, in offering a conceptual framework for a pathway model of musical communication by way of musical intuitive interaction and unstructured guidance – the 'how', 'when', 'what' and 'why' of music acculturation – related issues in the fields of 1) developmental psychology, 2) neuroscience, 3) educational science and 4) biological science will be explored.

1.1.1 The developmental pathway of music learning

This study takes as a point of departure the situation where the mother is the primary caregiver. The symmetrical position (mother-infant) can be conceptualised in the 'dyad system' where the actions of the individuals are jointly defined by both partners' behaviours (Jaffe et al., 2001: 2).

It is well documented that early mother-infant vocal interactions provide a specific framework for the child's later cognitive development. After a ten year pioneering study in the situated (home) environment, Jerome Bruner (1983) advances the notion that the dyad co-constructs a predictable format that serves as a foundation for the cognitive processes to learn a language, which means that language is learnt through the usage thereof. In the same vein, Marc Bornstein and Catherine Tamis-Lemonda (1997: 283) state that maternal stimulation of young infants influences young children's attention span and ability to progress towards more complex forms of cognition. However, in order to describe the developmental pathway of music learning comprehensively, the father in the tryad (Seeliger, 2005: 25), as well as the broader context of environmental influences (Bronfenbrenner, 1999: 4-6), are also considered.

Mothers respond intuitively to their infants' emotional behaviour, with vocalisations, body and emotional gestures, and songs (Trehub, 2003: 669). Typically, mothers vocalise (speak) at a 'high pitch, at a slow tempo and with emotional expressiveness' (Trehub, 2001: 1). On the other hand, infants respond with delight to the musical content, as well as the multi-modal information of mothers' performances (Longhi, 2003, cited in Juslin and Västfjäll, 2008: 586). Before long, the synchronisation of vocal, face and motor gestures upholds an increasing sense of relatedness with the other (Stern, 1985/2000: xiii).

With the concept of the subjective experience of the infant at the centre, the theoretical framework of Daniel Stern (1985/2000), describing the interpersonal world of the infant, offers a layered model of the senses of self and other as a state of relatedness that accounts for the 'social-emotional human world composed of self and others' (Stern, 1985/2000: xii). Stern advances the notion that the infant demonstrates an inborn motivation to respond with exceedingly adapted coordination to the intentional behaviour of the mother in experiences of primary intersubjectivity. A secondary intersubjective state of affect attunement unfolds in the performance of multi-modal (whole body) behaviours, between mother and infant, which expresses the quality of a shared 'vitality' effect. For example, if the infant expresses a joyful vocal melodic glissando, the mother 'imitates' and thus 'attunes' to it, making an upward movement with her body (Stern, 1985/2000: 138-142).

In addition, the evidence for the phenomenon of attunement (intensity, timing and shape) shows a clear parallel with the elements of music (Seeliger, 2005: 21) and is accordingly instrumental to my proposal that the developmental pathway design of music acculturation is a co-construction of 1) attunement to the feeling states of the other and 2) cognition of the musical interactive event.

1.1.2 The neurobiological pathway of learning

I argue that early, interactive experiences foster presymbolic musical representations (conceptualisations). Based on a brain-based approach for the cognition of musical experiences, a connectionist approach will be applied as a neurally inspired model of information processing in which mental musical representations are related to activity and connectivity among neurons (nerve cells) (Gruhn and Rauscher, 2008: 267, 276). Considering Gruhn's claim that conscious neural activation may be called 'audiation' (Gruhn and Rauscher, 2002: 456), I propose that neuroscience can inform on 'how to learn music'.

I argue further that early reciprocal coordination (between caregiver and infant) facilitates procedural knowledge by way of interpersonal predictions and expectations (Jaffe et al., 2001: 1). Accordingly, a constructivist position emerges in which cognition tends to evolve as a function of biological maturity, interactional behaviour and experience-driven activity (Gruhn and Rausher, 2002: 456; Braun and Bock, 2008: 27). Simply put, the repetitive, temporally structured 'narratives of individual experiences of companionship' (Malloch, 1999/2000:45) between mother and child are stored and processed for future use by way of recalling the non-verbal gestures of mother-infant vocal play.

1.1.3 The cultural pathway of development

In drawing on a dyad systems views of communication, a case is made that the ability to coordinate (take turns) and respond to vocal behaviours is an act of 'communicative musicality' (Malloch, 1999/2000: 29), and therefore already a cultural construct. Margaret Barrett (2006: 206) claims that the expressive bi-directional behaviour of the dyad is the 'genesis' of children's singing culture, and according to Colwyn Trevarthen, a pioneer in the field of early imitative behaviours, it prepares the way for learning a 'musical culture' (2008: 17). Furthermore, I argue that mother-infant vocal play is a simulation of the creative developmental strategies of art

making (Dissanayake, 2000). In the joint attempt to create sounds and movements in coordinated behaviour, the infant's vital role is afforded by a remarkable inborn ability for early imitative behaviour (Trevarthen, 2005: 94), as well as a sensitivity for temporal structure and melodic contour as features of musical structure (Flohr and Trevarthen, 2008: 58).

In addition I argue that musical acculturation could be enriched by way of musical parental guidance, structured around a theory of learning. According to Gordon (1997; 2001; 2003; 2006), audiation is to music what thinking is to language. Children learn to think and audiate shortly after birth and depend on the type of guidance they receive. In supporting young children's music acculturation, Gordon's Music Learning Theory, based on developmental and psychological premises, is useful as a model for recognising young children's ability to give meaning to music. The core of Gordon's theory is that all children have the innate capacity to learn music through joyful, unstructured and structured, musical guidance. Gordon recommends the absorption of musical patterns in various tonalities and metre so as to facilitate the structuring of musical presentations. He makes a case that it is through unstructured parental guidance at home that infants use intuition, which forms the basis for audiating cognitively. His learning theory is a perfect 'fit' for the aims of this research and will be implemented as such.

Thus, 1) intuitive and 2) guided music learning, viewed from a developmental, biological and cultural perspective, has emerged as a paradigm in this study. For that reason, a qualitative approach is appropriate for this study, where young children are not 'othered' (Janzen, 2008: 287), but regarded as mutual partners with distinct capacities for musical communication.

1.1.4 The musical predisposion of the newborn

Over the past forty years, developmental psychologists, neuroscientists, anthropologists and early childhood music educators have discovered a variety of cognitive, perceptual, motivational and social abilities of infants. This new knowledge is in rather sharp contrast with the previously held conceptualisation of newborns and infants. Dissanayake (2001: 335) has reviewed the shift as follows:

> Before these investigations, common pediatric wisdom accepted that apart from a few innate “reflexes”— for crying, suckling, clinging, startling-babies were “pretty much tabulae rasae for their elders to inscribe as they decreed”.

One of the first suggestions regarding human consciousness or ‘awareness’ was that we are born into a ‘booming buzzing confusion’ (James 1890, cited in Laughlin 1989: 148). Almost sixty years later, with the appearance of Chomsky’s (1957) leading model of language development, it was still understood that ‘relatively little development of cognitive importance occurred before the first words were uttered round about the beginning of the second year’ (Barrett, 1998: 267). Moreover, the long established sociological position of the child as cultural reproducer constructs the child as ‘passive’, and an ‘empty vessel’ (Janzen, 2008: 287). It was argued that infants and children lack the agency and competency to construct their own world. In order to get them ‘ready to learn’, they need others to ‘fill’ them with ‘skills, knowledge and dominant cultural values’ (Dahlberg, Moss and Pence, 2007: 45).

Scepticism still exists amongst a part of the scientific community pertaining to the biological foundations of music (Peretz, 2006: 3). This scepticism, though, turns out to be increasingly replaced with statements regarding the remarkable abilities and intentions of the young infant to communicate musically with vocal, emotional and corporal gestures (Malloch, 1999/2000: 29). Trehub (2001: 11), for example, writes that ‘[i]t is clear that infants do not begin life with a blank musical slate. Instead, they are predisposed to attend to the melodic contour and rhythmic patterning of sound sequences, whether music or speech’.

Various studies agree that young infants respond selectively and with cognitive awareness and intention to external social events (Jaffe et al., 2001; Trevarthen, 2005; Gratier and Trevarthen, 2008). Also, there has been a surge in interests in the biological origins of music (Trehub, 2001; Peretz, 2006; Braun and Bock, 2008), in the early onset of musical cognition (Kotilahti et al., 2010), in the increase of infant’s musical and movement responses according to sponaneous musical experiences at home (Kida and Adachi, 2008), in the parallel processing of music and language (Patel, 2003), in the spontaneous musical communication between mother and infant (Trevarthen, 1993; Malloch, 1999/2000; Gratier and Trevarthen, 2008), as well as the presence of musical elements, such as intervals, in the utterances of the infant (Tafuri and Villa, 2002).

I will therefore argue that the biological notion of predisposition suggests that the infant is well equipped with receptive musical skills and ready at birth for musical experiences. In taking biological, environmental and developmental factors into account, I argue that a natural pathway of music acculturation can be conceptualised as an early music learning process in an interpersonal relationship at home, where most of the infant's social, cognitive, physical and affective experiences take place.

1.2 Research objectives

The purpose of this study is to describe a pathway towards audiation, in the early stages of acculturation, as a result of the co-construction of attunement and cognition. The research questions investigated in this research project are posed to determine:

- the ways in which the abilities of the infant is conceptualised in education and music education research;
- the effect of a dyad systems view of communication on processes of cognition, attunement and musical acculturation;
- a music theoretical framework describing how infants learn in order to give meaning to music;
- the knowledge and skills that parents need to help advance their infant's processes of music acculturation.

1.3 Methodology and research design

This investigation is conceptual; it proceeds by argument and reflection rather than through the collection of empirical data. The argument will set out to apply insights from the literature on the intersubjective nature of affect attunement to the domain of music learning. A dual construction will subsequently be proposed as a natural pathway of music acculturation, so as to motivate parents to become personally involved in the unstructured musical guidance of their infants. The construction will include 1) the functional value of intuitive musical parenting, as well as 2) teaching guidelines to assist parents in becoming 'parent-teachers' (Timmer, 2008: 860) in the situated environment of the home.

The study will commence with a literature review, and proceed with an in-depth study of three specific bodies of literature: a) Daniel Stern's theory of the infant-adult

interpersonal relationship, b) the Music Learning Theory of Gordon and c) current research on the functioning of the brain and enculturation processes.

Chapter 1 is an overview of a dyadic systems-based approach for early music acculturation; it discusses theories pertaining to the psychological development of the infant, neurobiological pathways of learning, processes of enculturation and early cognitive and social capacities.

Chapter 2 is a synthesis of experiences of primary intersubjectivity, incorporating theorisations of Stern's layered senses of self, features and functions of mother-infant vocal play, the musical nature of mother-infant vocal play and the neurological processing of information.

Chapter 3 discusses the intersubjective experiences of the infant in terms of Stern's theorisation of the interpersonal world of the infant. It is argued that the interpersonal relationship sustains developmental outcomes of 1) procedural knowing, as a systems view of cognition and 2) attachment behaviours, as the ability to attune to feeling states of the other. It is furthermore proposed that the accumulation of procedural knowledge constitutes the vital beginnings of audiation, a concept developed by Gordon. The chapter concludes with a proposed theoretical framework for musical parental guidance.

Chapter 4 offers concluding perspectives on the infant's ability to acculturate to features of musical structure as a result of interactive experiences.

1.4 Value

This thesis begins to address the dearth of scholarly literature from which parents could be educated in informal early-childhood musical development. Parents frequently experience a lack of time, confidence and musical background to participate in musical activities at home (Zdzinski, 1996: 34). As a result they take too lightly their own contribution and are therefore unmotivated to become involved in the musical guidance of their children. Musical involvement can, however, bring about enormous benefits for both mother and child, as reported in an autographic study by Elizabeth Mackinlay. She writes that 'the power of maternal song [creates] places of excitement, empowerment, love and peace in the home for mothers and children' (2009: 717).

Some parents with enough leisure time and a good income are able to make use of professional music teachers, while others may not have the means. Furthermore, parents often blindly consider educational settings to ‘do it all and do it well’ (De Vries, 2009: 402). Therefore, parents should be informed on issues of developmentally appropriate theories and an adequate learning environment in order to evaluate music programmes in institutional settings. Moreover, they will value their own musical contributions and be empowered to make the right choices regarding the appropriate musical nurturing of their infants.

CHAPTER 2: Coordination in Primary Intersubjectivity

2.1 Introduction

A key text on intersubjectivity in infants' psychological development is Stern's *The Interpersonal World of the Infant* (1985; revised 2000). In his book, Stern has integrated clinical and experimental science in analysing the timing and synchronising of mother-infant exchanges (Stern, 1985/2000: 13-18). In his analysis and interpretation of the construction of primary consciousness in the course of interaction, Stern develops a radically new theory and relates it to the social and emotional world of the infant. He outlines four senses of self as a pathway of psychological development: 1) the 'experience of organisation-coming into being' as a sense of an emergent self (Stern, 1985/2000: 47); 2) an integrated sense of self that controls own actions and coordination with others as a sense of core self and other (Stern, 1985/2000: 69); 3) the awareness that subjective experiences are sharable with others as an intersubjective sense of self (Stern, 1985/2000: 124); and 4) the capacity for symbolic interpretation as a sense of a verbal self (Stern, 1985/2000: 166).

In this chapter I will argue that the infant's interactive behaviour during the first seven months of life, to which Silvia Español and Favio Shifres refer as the first 'dyadic psychological contact' (Español and Shifres, 2009: 93), shows an inborn motivation to respond with exceedingly adapted coordination to the positive[6] intention of the primary caregiver. The mother-infant relation will be described as an experience of 'primary intersubjectivity' (Beebe et al., 2003: 789), given that each partner's actions comes to be predicted by that of the other.

Also, it will be confirmed that the dyad's vocalising practices (mother-infant vocal play) is a natural and perfect opportunity, 'a privileged resource' (Español and Shifres, 2009: 93), to organise and unfold a subjective perspective of the self and the other. In this sense, terms used in this chapter such as non-verbal conversation, mother-infant vocal play, and mother-infant interaction are related to the same experience. In other words, it will be argued that an integrated awareness of a sense

[6] Positive intention refers to a relationship in which the parent shows positive affection and interest in the development of the infant.

of core self and of core other is maintained primarily by way of non-verbal[7] exchanges.

It will furthermore be shown that the spontaneous mother-infant vocal play has a definite musical quality which proves that the interactive experience is a foundation for processes of early music acculturation. Companionship in the early years represents an eagerness for music making.

2.2 Daniel Stern: a developmental pathway

Beatrice Beebe, Dorienne Sorter, Judith Rustin and Steven Knoblauch have summarised Daniel Stern's contribution to the theorisation of the 'interpersonal world of the infant' as follows:

> Daniel Stern has pioneered a theory of the infant's "dynamic emotions" and has described how the mother helps develop these into "narratives of the experiencing self", giving the infant confirmation of consciousness, by reflecting, or, as he puts it, "attuning to" the inner trans-modular multi-sensory impulses of moving and noticing. He and his colleagues such as Trevarthen have microanalysed the delicate timing and synchronising of mother-infant face to face interaction and addressed infants' theory of mind (Beebe et al., 2003: 810).

They moreover compare Stern's work to that of two other scholars of interpersonal relationships in infancy, Colwyn Trevarthen and Andrew Meltzoff, and point out that 'all three conceptualise a complex, presimbolic representational intelligence, a motivated and intentional (rather than reflexive) infant, capable of distinguishing self from the environment at a perceptual level. And all three emphasise positive emotion, playfulness, intimacy, and bonding as an essential function of intersubjectivity' (Beebe et al., 2003: 828).

In their article 'The Dance of Wellbeing: Defining the Musical Therapeutic Effect' Colwyn Trevarthen and and Stefan Malloch explain how Stern's research can impact on both theory and practice: on the one hand, the research helps to formulate a 'theory of self-awareness emerging in an emotionally supportive attachment relationship', and on the other hand it provides the impetus for 'sensitive therapeutic practices' (Trevarthen and Malloch, 2000: 7).

[7] 'Nonverbal exchanges' refer to expressive vocal utterances and spontaneous gestures.

Stern's 'layered model of development' understands infant development as a series of 'senses of self'. Importantly, these senses of self 'emerge together' as a 'progressive accumulation' rather than as successive stages, each of which 'replaces' and even 'dismantles' the previous (Stern, 1985/2000: xi-xiii). In this way, Stern differentiates his own model (which was influenced by earlier models such as that of Werner and Kaplan) from the pioneering theory of Piaget, which had for a long time held sway. In Stern's view, Piaget's model could satisfactorily account for the 'infant's encounter with the inanimate physical world (with space, time, number, volume, weight, etc.), [...] – but it was inadequate to conceptualise the encounter with the richer and more complicated social-emotional human world composed of self and others' (Stern, 1985/2000: xii).

Stern's own theory, therefore, sets out specifically to describe how the infant's consciousness comes into being through the co-construction (by the infant and his/her primary caregiver) of 'a subjective world of his experience of self and other' (Stern, 1985/2000: xvi). His theory is concerned with describing non-verbal communication between the infant and the parent so as to conceptualise the process of *primary consciousness.* Writing from a developmental viewpoint, this conceptualisation centres on 'finding (or attributing) implicit narrative meaning to the smaller behavioural patterns' (Stern, 1985/2000: xiv). For Stern, this conceptualisation can help developmentalists to explain the nature and formation of internal objects in greater detail, by understanding how internal objects are constructed 'from the patterned experience of self in interaction with another: What is inside (i.e. represented internally) comprises interactive experiences (Stern, 1985/2000: xv). This understanding leads him to explain internal objects as 'representations of interactions that have been generalised (RIGs)'.

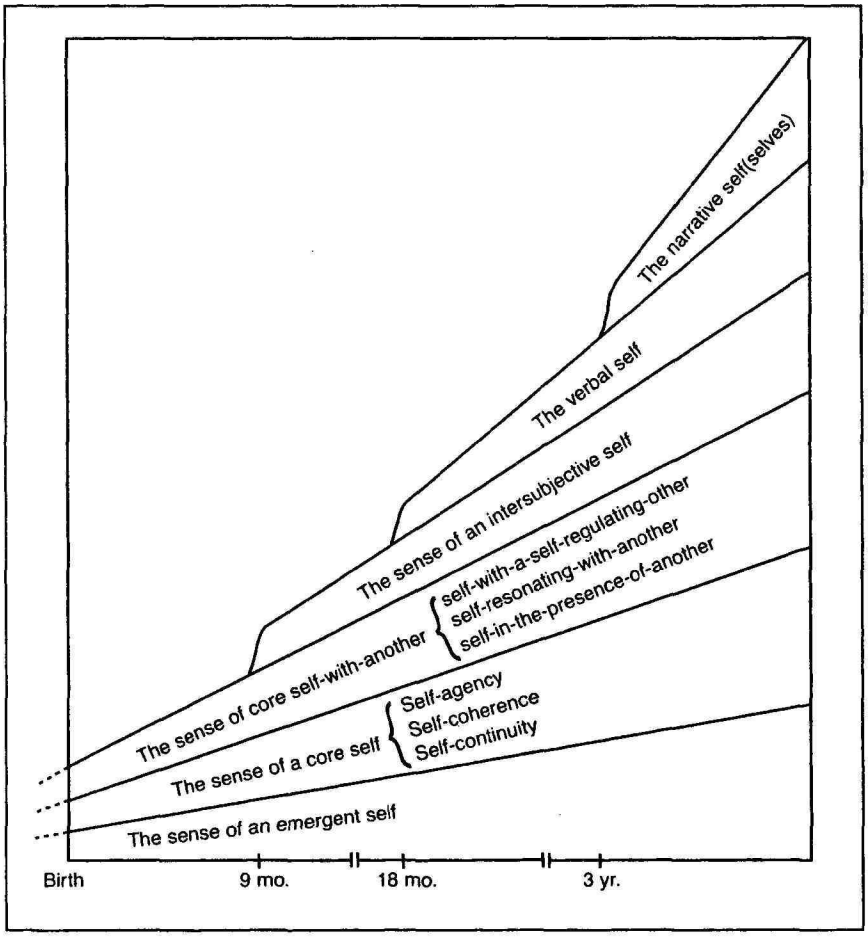

Figure 1: Daniel Stern's layered model of senses of self

The process of the construction of the infant's primary consciousness through interaction can be represented schematically by aligning the layered senses of self with a timeline of the infant's life from birth to the age of three years. Two senses of self that are involved in the natural occurrence of the mother-infant duet during the non-verbal phase of communication – those of emergent self and core self – will be discussed in turn in the remainder of this chapter, augmented and contextualised with related research findings from a broad spectrum of scholarly literature.

Consequently, it will be argued that the vocal and bodily gestures that evolve from the mother-infant interaction are indeed musical in nature.

2.3 The sense of an emergent self

> All learning and creative acts begin in the domain of emergent relatedness. That domain alone is concerned with the coming-into-being of organisation that is the heart of creating and learning (Stern, 1985/2000: 67).

The ‘sense of an emergent self’ in Stern’s theory consists of ‘the experience of a process as well as a product’ (Stern, 1985/2000: 45). These two components are interwoven in the sense that the process of forming sympathetic relations results in the product of the interpersonal relationship itself, the concept that Stern calls the internalisation of ‘We’. Therefore, Stern suggests that the infant can experience the process (‘coming-into-being’) of an emerging self as well as the result of that process (‘organisation already formed and grasped’) (Stern, 1985/2000: 45).

Stern’s discussion of the sense of the emergent self is organised into descriptions of three processes, described below.

2.3.1 Amodal perception and representation

Experimental research of the last 40 years has brought to light new insights regarding the learning capacities of the infant. Important among these is ‘the infant’s capacity to transfer perceptual experience from one sensory modality to another’ as well as the capacity to do so ‘in an experimental format open to replication’ (Stern, 1985/2000: 47). These capacities, known as the infant’s amodal perception, enable him/her to connect inputs from different sensory modalities to understand them as emanating from the same object. Using heart rate and behaviour as the respondent measures, Elizabeth Spelke (1979: 635) shows that infants recognise that an auditory temporal pattern corresponds to a similar visually presented temporal pattern. Thus, infants do not only perceive stimuli in the environment, but also transform them by way of mental processes; infants integrate information and in this way cognise their world:

> Infants appear to experience a world of perceptual unity, in which they can perceive amodal qualities in any modality from any form of human expressive behaviour, represent these qualities abstractly, and then transpose them to other modalities (Stern, 1985/2000: 51).

2.3.2 ‘Physiognomic’ perception

Stern also draws on the work of Heinz Werner on ‘physiognomic’ perception to explain the emotional nature of amodal qualities:

> [T]he amodal qualities that are directly experienced by the infant, are categorical affects [such as angry, sad, or happy] rather than perceptual qualities such as shape,

> intensity, and number. For instance, a […] line, or a colour or a sound is perceived to be happy, sad or angry.

Emotional display is therefore considered a vital medium for the dyad's intermodal communication and according to Werner, emerges from early expressive facial behaviour, hence the name "physiognomic" perception (Stern, 1985/2000: 53).

2.3.3 Vitality affects

In the same way that Werner showed analogies between the visual and feelings through amodal perception, Stern claims that such amodal perception (the transferability of sensory stimuli among modalities) extends to more 'elusive', 'kinetic' qualities such as 'surging,' 'fading away,' 'fleeting,' 'explosive,' '*crescendo*,' '*decrescendo*,' 'bursting,' 'drawn out'' (1985/2000: 54). For Stern, these feelings, or 'vitality affects' are of central importance to the development of the emergent self in relation to the other. Vitality affects, therefore, constitute other expressive experiences than the regular or traditional feelings such as happiness and sadness. The prime example of these vitality affects are the everyday parental acts of nurturing. In turn, Stern (1985/2000: 56) understands the musical dialogue between parent and infant as an example *par excellence* of such parental nurturing.

In order to describe vitality affects more clearly, Stern uses the image of a 'rush'. In this description, music is again one of the examples that he mentions (he uses the phrase 'an unmeasurable wave of feeling evoked by music'). One could think of an example such as singing a lullaby with a *decrescendo* phrase structure, at the same time stroking the baby's body in an analogous manner. These two sensory experiences activate the same vitality affect, and consequently result in the infant's assimilation of information through (the interpersonal) experience. Stern (1985/2000: 59) argues that this amodal experience of vitality affects, delivered by a 'soothing vitality affective mother', supports the infant with the steps forward towards perceiving, understanding and conceptualising the other:

> [All] three processes involved in forming a sense of an emergent self and other: amodal perception, physiognomic perception, and the perception of corresponding vitality affects […] are forms of direct, "global" perception, in which the yoking of diverse experiences is accompanied by distinctive, subjective experiences (Stern, 1985/2000: 60).

According to Stern (1985/2000: 61-64), interactive amodal experiences (including vitality affects), as well as the constructionistic efforts of assimilation, accommodation, association, and the identification of mental patterns in the mind, are the fundamental processes involved in the organisation of information in the domains of motor activity, affectivity and states of consciousness.

2.4 The sense of a core self (i): self versus other

For Stern, the infant's sense of a core self develops in two interdependent layers: a sense of a self versus other, which is characterised by an integrated awareness of the subjective self, and a sense of self with other, when the infant begins to participate as a dynamic and energetic social person. In fact, the period roughly from two to six months, being mainly about the beginning of an exciting relationship, 'is perhaps the most exclusively social period of life'. By two or three months 'the social smile is in place, vocalisations directed at others have come in, [and] mutual gaze is sought' (Stern, 1985/2000: 72). It is during this time, before the infant becomes interested in inanimate things such as toys, that face-to-face coordinated interactions are 'the emotional peaks and valleys of social life' (Stern, 1985/2000: 75).

Stern (1985/2000: 69-70) claims that the infant has the capacity to identify three crucial experiences in order to form an organised sense of core self. It is argued in this study, however, that these experiences take place within a social context, following that infants should be provided with the opportunity, by way of reciprocal relations, to experience these invariants in order to develop a sense of core self. They are 1) agency, 2) self-coherence and 3) self-history.[8]

2.4.1 Agency

A few weeks after birth the infant appears to be a more 'integrated' person who becomes able to experience self-actions as well as focusing on other people as 'separate interactants' (Stern, 1985/2000: 69). For Stern, agency is primarily about the infant's actions and the connection of the body in relation to the environment, as experienced by the infant. Stern refers to this organising subjective perspective as

[8] Although Stern's 1985 book refers to a fourth experience regarding the core self, namely that of self–affectivity, in his new introduction to the edition, he explains that he had eliminated this component from his model as he believes it to be contained within the other senses of self.

‘self-agency’, the know-how or ‘authorship of one’s own actions and nonauthorship of the actions of others’ (Stern, 1985/2000: 71).

In explaining the organising subjective perspective of self-agency, Stern (1985/2000: 71-78) states that out of consciousness, from the very beginning of life, the infant demonstrates the capacitiy and motivation to identify essential ‘islands of consistency’ (Stern, 1985/2000: 76). He continues that these unchanging experiences, ever present in a relationship, are crucial to a sense of a core self and involve the three subjective experiences of volition, proprioceptive feedback, and anticipation of the consequences of self-action within interactive processes.

2.4.1.1 Volition

The first experience is the sense of volition, or the will to act. Volition should be understood as a ‘mental registration’ in the form of a ‘motor plan’. The ‘motor plan’ always precedes any form of action and in combination with a selection of muscle groups, results in an act (Stern, 1985/2000: 77-78). John Flohr and Colwyn Trevarthen (2008: 67) explain the motor plan as follows:

> Guiding a movement to a goal requires an efficient and automatic discrimination, in advance, of the different effects inside the body that have to be perceived when action in one sense of time has to be sent along the path to an object that is being handled outside the body.

Stern continues that acts such as gazing in the mother’s eyes, or vocalising for attention, are not impulsive or reflexive, but rather functions of properties of the mind in the psychological integration of perceived information. In so doing, infants are active recipients of environmental stimuli, who not only ‘plan’ with determination, but also ‘seek out’ and ‘invite’ new and higher levels of stimulation (Stern, 1985/2000: 75). For example, the evidence is persuasive that the young infant is capable to ‘seek out the stimulus features of movement, size, and contour density’ (Stern, 1985/2000: 61). Flohr and Trevarthen (2008: 59) connect this observation to the infant’s ability to initiate a rhythmical relationship:

> Infants are born with sensitivity for the rhythmic expressive movements of other people. They attend with eyes, ears and touch, and show responses with a matching sense of time in movement. Affectionate adults are attracted to the infant’s interest and modulate their talk and gestures to engage in games of address and reply or

assertion and apprehension of intentional looks, vocalisations and hand movements and touches.

2.4.1.2 Proprioceptive feedback

Secondly, Stern (1985/2000: 89) explains that the infant experiences proprioceptive feedback[9] by way of self-generated action. For example, already at the age of two months the infant has emotional experiences of, for example, joy and distress, which could be intensified by either the energetic, or passive vocal interplay with the mother. Stern proposes that for each different emotion, the infant becomes familiar with forceful feedback from: 1) particular 'motor outflow patterns' to the face and vocal apparatus; 2) of sensations associated with external stimulation (such as the mother's high-pitched vocal performance); 3) of emotion-specific qualities of feeling.

According to Bennett Reimer, emotions require felt, aware feelings to carry out their potentials. Emotions can be named in words such as 'happy', but feelings are non-verbal and subjectively experienced (Reimer, 2003: 81). Thus, feelings (as a non-verbal mechanism) assist to 'engage [infants'] bodies to thought processes so as to consciously relate and know' […] 'Feeling is the key to the occurrence of and the workings of the conscious' (Reimer, 2003: 78). Thus, feeling is a way of knowing, of becoming aware of the signs and symbols of one's culture. For example, during vocalising episodes, the infant will perceive the specific timbre and melodic contour of auditory stimuli, experience the flexing of the specific muscles of the vocal cords and at the same time experience own feelings of wellbeing as well as the positive intention of the mother.

Yet another sense of proprioceptive feedback is experienced by the infant through 'other-willed' action, such as being held at the wrists when a partner plays the singing game 'clap-hands' (Stern, 1985/2000: 80), or when the mother, for example, dances rhythmically with the infant and in so doing manipulates the infant's body parts in space and time.

[9] During proprioceptive feedback a sensory nerve ending in muscles, tendons and joints provides a sense of the body's position by responding to stimuli from within the body (Microsoft Encarta Dictionary, n.d.).

2.4.1.3 Anticipation of the consequences of self-action in interactive processes

The third unchanging experience takes place after several repetitions of the same actions or rituals performed upon the self as well as upon others. The infant begins to anticipate the consequences of self-action as a result of repeated episodes of interaction (Stern, 1985/2000: 71). For example, the infant would vocalise intentionally in order to invite parenting strategies during face-to-face communication (Custodero and Johnson-Green, 2008: 15). In her book *Das Musikschiff: Kinder und Eltern Erleben Musik,* Maria Seeliger (2005: 85) presents the example of the infant's exploration of musical toys (e.g. rattles, mobiles) in order to demonstrate his/her capacity to manipulate and foresee procedures. Seeliger explains that the infant 'plans to' manipulate the mobile, hears and sees the consequences and thus learns by repetition that the mobile can be controlled and in so doing regards him/herself as the 'author' of the sound.

Thus, Stern argues that the infant, in a responsive and loving relationship, has the opportunity to accomplish a sense of agency in developing an awareness of bodily sensations; in touching the other and being touched, in moving in time with the other, in hearing and seeing what happens as a result of self-actions. For example, the infant becomes physically aware of the sensation of flexed vocal cords when vocalising, but also perceives actions manoeuvred by another, such as the mother's rocking movements before bedtime. The range of actions that afford a sense of agency are summarised by Flohr and Trevarthen (2008: 64) as follows:

> The agency of the infant's Self includes active postural movements and gestures with orchestrated rhythms that define and explore awareness, first of the body itself, felt in its flesh and joints proprioceptively, then of the world outside that the body comes in contact with and appreciates expropriocceptively, by touch and hearing before birth, then by sight.

This growing consciousness is guided emotionally. In other words, in the mental organisation of the world by way of interactive procedures, the infant is provided with the opportunity to acquire experience with the regulation of the self and the other and by this way internalises that 'our actions seem to belong to us' (Stern, 1985/2000: 77).

Furthermore, the infant's capacity to regulate the know-how of self-actions and interactions (so as to develop a sense of core self and core other) is the outcome of

an *inborn* system that 'motivates' him/her to be part of a contingent relationship, discussed in the next section.

2.4.1.4 The dual role of intrinsic motive formation (IMF)

> Human musicality includes an inventive and collaborative motivation for *acquiring musical skill*, for joining a musical tradition. It is motivated by innate sympathy for expressive movement between performers, plus a need to find meaning in another's sounds (Bannan and Woodward, 2009: 467).

In an orginal contribution, Colwyn Trevarthen and Kenneth Aitken state that the infant has an inborn mental capacity and motivation to direct engagements of mind and body to environmental stimuli; to coordinate the body with the actions of others, to match the emotional vocal utterance of a partner, to express sympathetic feelings towards a partner with emotional gestures and integrated whole-body movements. In a nutshell, the infant is eager to learn from others in the vicinity.The infant's mind must have an "innate self-with-other representation" of the inter-mind correspondence and reciprocity of feelings that can be generated with an adult' (Trevarthen and Aitken, 1994: 597). In other words, infants are motivated to exchange cooperative actions with others from the beginning of life, a drive that Trevarthen and Aitken conceptualise as an intrinsic motive formation:

> We propose that an "intrinsic motive formation" [IMF] is assembled prenatally and is ready at birth to share emotion with caregivers for regulation of the child's development, upon which cultural cognition and learning depend (Trevarthen and Aitken, 1994: 597).

Moreover, according to Trevarthen (2005: 91), infants cooperate with others by making good use of the 'sympathetic rhythm of imitation'. In other words, the intrinsic motivational system drives the infant to learn the cultural ways of the immediate environment, and indeed by way of mimicking the vocal, emotional and bodily gestures of others with whom they are in an affectionate relationship. Anna Katharina Braun and Joerg Bock explain this tendency from a neurobiological perspective:

> Starting at birth, children possess a natural drive to learn; they want to learn about everything in the world and their insatiable curiosity and fascination for novel things and events is hard to stop (Braun and Bock, 2008: 41).

In illuminating the uniqueness of human culture, Bjorn Merker writes from an evolutionary perspective that humans, different from our nearest relatives, apes, learn by way of imitative behaviour. Vocal learning, for instance, depends on the imitative faculty to 'shape our vocal output to match the pattern of auditory models received through the sense of hearing […] we do so when we sing, and when we imitate animated and unanimated sound sources of whatever kind' (Merker, 2009: 50).

It follows that newborns are inclined to 'stimulate the development of imitative[10] and reciprocal relations with corresponding dynamic brain states of caregivers' (Trevarthen and Aitken, 1994: 597). However, although there is adequate evidence that the dyad's mimetic behaviours is crucial for the accomplishment of an emotional relationship and learning, 'the hypothesis of a strong link between emotion and imitation was forgotten under the influence of Piaget' (Kugiumutzakis et al., 2004: 161). Trevarthen (2005: 91) agrees that the limited viewpoints of e.g. Piaget and Skinner, who regard neonatal imitative behaviour as impossible, contest the intuitive readiness to synchronise emotionally, gesturally and vocally in the course of early non-verbal conversation.

Papoušek and Papoušek (1981: 93) have also found that the mother intuitively reinforces imitative behaviours by way of repetitive procedures. In response, newborn babies imitate within hours of birth simple vocal sounds and gestures (Trevarthen, 2005: 91). Moreover, it was shown that a newborn, 42 minutes old, imitates facial actions (Meltzoff, 2005: 70), demonstrating the motivation and capacity to learn by way of mimetic behaviours. In order to explain the subjective experience of the infant during reciprocal imitative procedures, Andrew Meltzoff (2005) makes use of a 'like you' and a 'like me' hypothetical framework:

> The crux of the "like me" hypothesis is that infants may use their own intentional actions as a framework for interpreting the intentional actions of others. The dyad is persons in relation, who act with agency to do things […]. Infants imbue the acts of others with felt meaning, not through a process of step-by-step formal reasoning, but because the other is processed as "like me" (Meltzoff, 2005: 55).

[10] Imitation occurs when three conditions are met: 1) the observer produces behaviour similar to that of the model; 2) the perception of an act causes the observer's response and 3) equivalence between the acts of self and other plays a role in generating the response (Meltzoff, 2005: 60).

Simply put, the infant imitates the actions of those by whom they are nurtured. The self needs the other to learn from, and the sense of core self unfolds during episodes of vitality; that is, in exchanging and adjusting to the mutual feeling states of others.

In the light of the argument thus far, it becomes necessary to dispute Gordon's clinical theorisation that young children start imitating sound patterns more or less at the age of two years (Gordon, 2003: 237). In this regard it is necessary to state that same and different sound patterns do not 'pour' into the ears of the infant. According to new evidence, imitative behaviours start much earlier and this should be recognised. In fact, Gordon's plea for a rich musical environment should include the intuitive and non-verbal mother-infant conversational behaviour in the first year of life. In reality, the intuitive and emotional musical dialogue in the first year of infancy is a prerequisite for the development of musical skills:

> The inherently musical communication between parent and child defines the nature of our earliest sound group; later, we may become members of various social groups characterised by specific musical activity, including those organised by peers on the playground and teachers in the music classroom or studio. Such musical experiences shape practices and preferences, thereby contributing to lifelong associations with music and music making (Custodero and Johnson-Green, 2003: 102).

The capacity to imitate musical information is a crucial part of the lifelong learning process (Gordon, 1997; Gordon, 2003; Green, 2008; Koops, 2010). Papoušek and Papoušek (1981: 93) state that learning to sing a song could not take place without early imitative behaviour as part of a sequence of integrative processes. Likewise, Gordon (1997: 19, 91) suggests that music learning takes place in an integrative and progressive way; the ability to discriminate between same and different sound patterns prepares the process of recognition. Recognition enables the ability to imitate, which eventually supports the skill to audiate. This means that the pathway towards audiation should include frequent opportunities to imitate the musical behaviours of others; experiences the infant has abundant access to during the daily events of mother-infant vocal play.

Thus, the sympathetic cooperation between mother and child drives imitative processes, given that 'imitation involves expectation for its perceptual validation from the other person's reply' (Trevarthen, 2005: 94). Hence, it is at the beginning of life,

during reciprocal vocalising episodes of affection, that learning processes commence by way of imitative behaviours.

Additionally, Jaak Panksepp and Colwyn Trevarthen add a second dimension to the functioning value of the intrinsic motive force in providing a clarification of the infant's surprising capacity to perform musically by 'acting in time' during mutuality. They write that the integrated system appears to be not only a 'primordial' feature in the 'embryonic brain' that drives learning, but also maintains 'music-emotional' growth throughout life (Panksepp and Trevarthen, 2009: 118-119). This means that musical experiences are embedded in emotionally related activities.

The authors explain that the intrinsic motive force could be defined as an integration of 'nerve systems that activates, integrates and steers movement and aims the perceptual guidance of the moving body […] in relation to forces arising from contact with the external media' (Panksepp and Trevarthen, 2009: 119). They argue that three fundamental systems are perceptually *and emotionally* synchronised during intimate mind-body interactions in the following way: 1) by way of proprioceptive experiences for feelings of wellbeing of the mind and body; 2) exteroceptive experiences for feelings of positive engagement with the spaces and substances of objects of the physical world that have become 'personified' such as well-known songs (Stern, 1985/2000: 122) and 3) alteroceptive feelings of wellbeing in experiencing the sympathetic intentions of other persons during interactional situations.

Of specific importance is Panksepp and Trevarthen's (2009: 119) proposal that these processes are essential for the development of early music acculturation: '[H]uman musical activities and experiences […] develop […] all three these regulatory systems'. For this reason, mother-infant vocal play, singing routines at bedtime, favourite sound games and mutual enjoyment of musical objects and playthings are all interactional situations by which the infant's psychological development benefits significantly. For example, in hearing a lullaby, the infant alteroceptively experiences feelings of wellbeing, exteroceptively experiences an object of the physical world, for example the content of the song and proprioceptively experiences the affectionate tone of the mother's voice and her rhythmical movement.

It is clear that different systems as described above are cued together and consequently contribute to early music acculturation, by way of bi-directional communication. Panksepp and Trevarthen (2009: 113-114) also apply their explanation to the communication of feelings of wellbeing during spontaneous episodes of mother-infant vocal play. They argue that, though little is yet known about how affective properties of music themselves modify the brain, the 'vitality effects' or 'feeling states' apparent in mother-infant conversation are perceived as kinetic forms with musical qualities[11] and that these properties are related to the neuroscience of basic emotions such as sadness or joyfulness. In this line of argument, basic emotions can be related to typical body movements between mother and infant, such as making upward or downwards movements, relaxed or tense movements, receiving the other's gestures or holding back, or acting in a cheerful or gloomy manner (Krantz, 2007, cited in Panksepp and Trevarthen, 2009: 112).

In other words, in exchanging a variety of gestures with musical features, the infant's emotional state is being regulated. The mother and infant 'engage one another by hearing, sight and touch and regulate and exchange states of interest, intention and emotions with intuitive ease, exhibiting intricate synrhythmic activity' (Flohr and Trevarthen, 2008: 68). Through these processes, the infant engages into the beat of the intrinsic motive pulse (IMP) (Malloch and Trevarthen, 2009: 8), a system of generators *within* the intrinsic motive format (IMF) (Osborne, 2009: 553). So, the infant is not only motivated to 'pick up cultural ideas' (Trevarthen, 1994: 219), but also able to perform motoric actions with surprising skill during non-verbal communication. Trevarthen (2005: 102-103) writes that during mother-infant vocal play, the intrinsic motive pulse

> attracts babies' interest, stimulates pleasure in them and makes them move [...] It communicates with the very young human being because it engages with the beat of an Intrinsic Motive Pulse (IMP) generated in the human brain.

After repeated episodes of coordinated behaviour, the infant starts anticipating the mother's reply. Thus, the infant gradually develops the proficiency to give and to take. In so doing, the infant learns when and what to expect from 'the other' which in turn sustains the capacity to differentiate the self from the other. Stern analyses real

[11]Stern explains that 'vitality effects' or 'feeling states' are the amodal perception of kinetic qualities such as 'surging', 'fading away', 'fleeting', 'explosive', '*crescendo*', '*decrescendo*', 'bursting', 'drawn out'' (1985/2000: 54).

life experiences of coherence that uphold the developmental skill to differentiate the self from the other, which will be discussed in the next section.

2.4.2 Self-coherence

According to Stern a sense of core self or core other becomes apparent in the infant's emergent capacity to distinguish 'self versus the other' as a single, coherent, bounded physical entity (Stern, 1985/2000: 82). In other words, experiencing various characteristic features, the infant develops a sense of being, 'a nonfragmented, and physical whole' (Stern, 1985/2000: 71).

To Stern, the integration of several features which are attributes of the interpersonal relationship contributes to a sense of self-coherence or ability to distinguish the self from the other. These are 1) unity of locus, 2) coherence of motion, 3) coherence of temporal structure and 4) coherence of intensity, structure and form.

2.4.2.1 Unity of locus

Stern writes that the young infant not only displays the capacity to visually orient to the source of a sound, but also to anticipate that the sound of the mother's voice should come from the same direction as the visual location of her face (Stern, 1985/2000: 82). Thus, in making eye-contact during face-to-face singing and chanting procedures, the mother provides the infant several times a day with a variety of learning experiences that originate from one 'locus' or centre. Moreover, during mother-infant musical interactions, infants are not only exposed to auditory stimuli, but also receive information from multiple modalities such as corresponding movement activities and touching gestures which are according to Lewkowicz (2000: 282) 'much more robust' than uni-modal information. In this way, mothers provide multisensory stimulation and these have a profound effect on the infants' emotional and learning processes, as reported by Longhi (2009: 195). Besides, Stern (1985/2000: 93) suggests that after two months of age, emotions, as displayed and most probably felt, remain mostly the same throughout life.

2.4.2.2 Coherence of motion

Stern advances the notion that objects that move coherently in time belong together. He continues that movement which is portrayed against a relatively motionless background (such as a wall) provides the infant with structural information. In this way, information that establishes a sense of core self becomes available to the infant

(Stern, 1985/2000: 82-83). Incidentally, the infant is provided with a rich variety of experiences in observing the actions of the musically moving mother, be it rhythmical movement such as swaying in accompaniment to a lullaby, expressive moving such as heavy or light, slow or fast during playful activities, or movement with the whole body in order to simulate the infant's utterances during mother-infant vocal play.

2.4.2.3 Coherence of temporal structure

In a similar vein, Stern argues that an established temporal structure provides infants with information in order to differentiate the self from the other. Stern continues that the ability to synchronise own body parts (voice, face, torso), during interactive activities, involves temporal regulation for actions such as stop, start, and changing of direction. Accordingly, a 'common' temporal structure emanates and is perceived proprioceptively by the infant, whereas those emanating from the mother establish a different synchrony and are perceived by the infant as a structure different from the self (Stern, 1985/2000: 83).

The mother exaggerates perceivable features of maternal synchrony (Stern, 1977: 14-20), in this manner scaffolding the infant's development. For example, in well-known games such as 'peek-a-boo', where 'starts and stops' of vocal and body gestures take place, the mother embellishes her behaviour with big excited movements so as to demonstrate each partner's turn and in so doing facilitates reciprocal turn-taking behaviour.

Longhi takes the issue of synchronous behaviour one step further. She investigated the mother's didactic parenting skills pertaining to the temporal structure of 'songese', a term she coined as the singing equivalent of 'motherese' (Longhi, 2009: 195-196). Portraying the mother as an 'orchestra conductor' (2009: 203), she describes the diligent mother who makes musical structure obvious to her infant so as to regulate the level of attention and arousal. The mother accentuates the flow of the metre and phrase structure as well as invites the infant to respond by leaving 'gaps' at certain points:

> In fact, the integration of the mothers' multimodal sensory information ensures a temporally coherent segmentation of the musical event while singing and moving their own as well as the infants' bodies [**...**] in so doing "helping the infants to parse and process the sensory information" (Longhi, 2009: 208-209).

On the other hand, the infant, an agent of its own development, demonstrates an exquisite sensitivity towards temporal structure and its regulation. The following findings exemplify the infant's predisposed capacities to interact rhythmically with another:

- The infant is able to regulate the timing of actions in terms of duration. For example, from the moment of birth, infants perform 'kicking' movements which consist of rapid flexed movements, followed by slighter longer extensions and pauses at the end. If the infant increases the length of the pause, the length of the kicking decreases (Thelen, 1981: 243-244) in the same way as the regulated process of natural walking at a later stage (Pouthas, 1996: 116).
- The infant is able to adapt the temporal parameters of the length of certain behaviours. For example, if positive auditory stimulation (such as a recording of the mother's voice, or an intra-uterine heartbeat or music are presented to infants, three day olds respond enthusiastically. They modify the temporal structure of bursts of sucking and intervals of pauses by shortening the pauses. In so doing, infants communicate their preference in a non-verbal and rhythmical way (DeCasper and Sigafoos, 1983: 19-25).
- Similarly, Darcheville et al. (1993: 250) found that infants show self-control in delaying a response until a reward (a cartoon) is available.
- An experiment with a nine week old shows that infants are able to detect very small differences in temporal structure (Pouthas 1996: 123). In this experiment, done in 1977 by Demany, a rhythmic sequence was started and stopped if an infant turned its head to look at a small bright light and then looked away. The outcome was that the duration of the period spent staring at the light decreased progressively; the infant grew used to the stimuli and therefore became less interested. However, it strongly increased when the sequence was changed. In reflecting on this experiment, Viviane Pouthas (1996: 123) infers that young infants do not perceive sounds as a series of isolated events, but, like adults, are able to discriminate between rhythmical sequences.

2.4.2.4 Coherence of intensity, structure and form

Another feature of coherence, sustaining a sense of core self, is the correspondence in intensity between different behaviours of the self (Stern, 1985/2000: 86). For example, during joyful vocalising episodes, the infant proprioceptively experiences an

intensifying of vocal cords, and at the same time observes the visual images of energetically kicking legs. In this situation, the loudness of the infant's vocal gestures is matched by the synchrony of energetic movement gestures. Accordingly, the infant is in the position to experience that the action 'belongs to the self'. In a similar vein, Stern continues that the face of the other becomes a property of the 'other' and adds to the task of separating the self from the other in daily face-to-face interactions (Stern, 1985/2000: 87). This proclivity can be demonstrated as follows:

- In his discussion of an experiment done by Mendelsohn (1983), Pouthas comes to the conclusion that various sensory modalities are coordinated at a very early age. Mendelsohn showed a film to four month olds in which a hand opened and closed according to different tempi. The four month old babies showed their ability to discriminate visually between different tempi in that those who were familiarised with one of the two sequences before watched for a longer time to a newly introduced thythmic pattern as a reaction to novelty (Pouthas, 1996: 127).
- Elizabeth Spelke (1979: 635) found that infants have capacities for intersensory processing of temporal information. In her experiment, she presented a film of two dolls jumping at different tempi to four month old infants. One doll was accompanied by a rhythmic sound sequence with a corrresponding tempo. The infants preferred the intersensory experience, and watched the integrated stimuli for longer periods.

2.4.3 Self-history (memory)

The pathway of self-memory starts prenatally. A lullaby sung by the mother, before and again after birth, is recognised by the infant, which shows that learning has taken place (Satt, 1984, cited in Lecanuet, 1996). Reciprocal action exchanges between mother and infant, starting shortly after birth, support the forming of memories in what Maya Gratier and Colwyn Trevarthen call a 'synbiographical' (2008: 133) sense of self. From a neurobiological point of view, Braun and Bock state that the 'experience-driven reorganisation of neuronal networks' do not only sustain cognitive development, but also the organisation of processes of well-being (2008: 27). Wilfried Gruhn, in reflecting on Spitzer's (2002, cited in Gruhn 2004: 2) notion of long term memory, explains the co-construction of emotion and cognition as follows:

> Whenever a perceived set of sensorial data can be integrated because a similar set is already established, the brain seeks for a repetition of this [emotional] state so that

> finally the efficient activation will be strengthened and stored in long term memory (Gruhn, 2004: 2).

In order to understand the infant's 'capacity to remember', Stern (1985/2000: 90) explains that everyday shared experiences sustain a sense of continuity (or memory). Drawing on the research of Hinde (1979), Stern remarks that 'continuity […] is the crucial ingredient that distinguishes an interaction from a relationship, with self as well with another' (1985/2000: 90). In this regard, Trevarthen pays tribute to Stern's dynamic theorisation of the infant's capacity to memorise features of mutuality:

> [Stern's] work raises the absorbing question of how we may be transported from the intricate immediacy of what we are doing in any one of these short carriages of existence, only a few seconds long, into a past narrative of remembrance, or off into a future of hope and fears for the novelties and repetitions that will catch our awareness later, tomorrow, or in years to come. Now, that is psychodynamics (Trevarthen, 2005: 93).

Thus, mother-infant conversation, or what Trevarthen metaphorically refers to as 'time in the mind' that transforms into 'past narratives of remembrance' (Trevarthen, 2005: 93), eventually carries into meaningful and lifelong learning experiences.

Stern continues that three memory systems, 1) 'motor memory' (a representation of an act), 2) perceptual memory' (a representation of e.g. form) and 3) 'affect memory' (a representation of feelings of well-being) are integrated and transformed in an 'accumulated sense of continuity'. He makes clear that the three invariants of agency (a sense of volition, ability to perceive proprioceptive feedback as well as the ability to predict the consequences of self-actions) all add to motor memory. For example, in seeing a musical mobile, the infant will remember the pleasant auditory experience, make use of a 'remembered motor plan' and kick the mobile to have the same pleasureable effect (Stern, 1985/2000: 91-92).

Musical routines that take place in the intimacy of the family context contribute in a significant way to cognitive and emotional competencies. Trehub (2003: 671) writes that a special repertoire of lullabies and play songs[12] affords a sense of continuity

[12] Lullabies are sung slowly and expressively, with coordinated, sustained movement, and serve the purpose of soothing the young infant. In contrast, play songs are characterized as faster in tempo with

and emotional bonding. She continues that the mother facilitates the infant's learning processes in performing these musical activities frequently and with very similar exaggerated behaviour as in the case of infant-directed speech, specifically at a high pitch and a slow tempo (Trehub, 2003: 671).

2.4.4 Integrating the self-invariants

Stern notes that experience 'as it is lived' takes the form of 'episodes' and that recurring and diverse 'lived experiences' bring about the organisation of 'episodic' memory (Stern, 1985/2000: 94). This means that it is during the interactive event, 'the social world [the infant] is in now' (Trevarthen, 2005: 106), that the young infant has the opportunity to mentally integrate essential dimensions that uphold the ability to remember the interactive encounter as a coherent experience. Stern identifies these dimensions as 'sensations' (awareness of stimuli); 'perceptions' (conceptualisation of aural, visual and tactile stimuli such as the high pitch of the mother's voice); 'actions' (mental registration of a motor plan); 'thoughts' (ordering of events by way of symbolic reasoning); 'affects' (feelings of bondedness) and 'goals' (communication with others) (Stern, 1985/2000: 95).

Furthermore, Stern suggests that mutual 'episodes' that take place several times a day, become 'generalised'. In this way, the day-to-day performances of the dyad are mentally transformed into mental images, representations or RIGs (representations of interactions that have been generalised), (Stern, 1985/2000: 94-97) as discussed in Section 2.2. In other words, RIGs form a basic 'memory unit' (Stern, 1985/2000: 98) or 'image' of the actions, feeling states and perceptions that have become personalised (known) to the infant in the course of non-verbal communicatation. It follows that 'RIGs can thus constitute a basic unit for representation of the core self', because it 'results from the direct impress of multiple realities as experienced' (Stern, 1985/2000: 98). For example, RIGs of mother-infant vocal play comprise perceptions such as the emotional tone and expressive melodic contour of the mother's voice, the happy form of the mother's face, feelings of shared excitement and representations of when and how to coordinate appropriately.

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a wider pitch range than lullabies, and are performed to arouse and entertain the older infant (Bargiel, 2004: 4,5).

Hence, it is clear that mother-infant vocal play is represented by the infant as a coherent unit of lived experience, and that it has both cognitive and emotional qualities. Ellen Dissanayake puts this point across strongly: '[m]other-infant vocal play] is not the trivial or inane pastime that it might superficially seem but, rather, a cradle in which nascent psychosocial capacities can emerge and be developed' (2001: 336).

Tali Shenfield, Sandra Trehub and Takayuki Nakata verify the cognitive and emotional qualities in showing that play, the oldest form of learning, is indeed 'inseparable from learning' (Braun and Bock, 2008: 41). The researchers collect saliva samples from infants just before maternal singing and again afterwards in order to test the infant's responsiveness to the voice of the mother. This procedure indicates the cortisol levels of infants and serves as a pointer toward states of arousal and attention. Indeed, the researchers found that these encounters 'promote arousal levels that are optimal for sustained infant attention or interest' (Shenfield, Trehub and Nakata, 2003: 371-372). From a neurological perspective, Braun and Bock indicate the value of early stimulation for outcomes of cognition and bonding:

> Early experience plays a powerful role in shaping adult brain circuitry and behaviour. Learning in childhood differs from adult learning in that experience and learning events are used to optimise immature, preliminary and unspecific neuronal networks in the brain […] This developmental neuronal reorganization determines not only cognitive, but even more emotional competence through such "experience-driven" reorganisation of neuronal networks (Braun and Bock, 2008: 27).

Moreover, mother-infant vocal play is highly preferred by the infant. For example, infants attend to audiovisual presentations of the mother's image more in the case of maternal singing than maternal speech (Nakata and Trehub, 2004: 455) and prefer their mother's face (Bushneil, Sai and Mullin, 1989: 3) to that of a stranger. Moreover, infants show openness to positive, smiling facial expressions in comparison to neutral facial expressions (Kuchuk, Vibbert and Bornstein, 1986: 1054) and attend to the exaggerated intonation of mother-vocal play more than to normal adult speech (Fernald, 1985: 181).

Accordingly, a sense of core self and core other emerges from the social-emotional interaction of mother and infant. The lived pathway of coordinated actions, associated feelings and coherent perceptions of self and other becomes integrated

and stored as continuous experiences in the mind of the infant. The mutual regulation of emotional narratives during face-to-face interaction supports the perfect condition for intense engagement which in turn provides a framework for the co-construction of music learning and bonding. For this task the young infant is well prepared. In fact, newborns are attracted to the richness of maternal expressions. They make intense eye contact and watch the mother's lips more strongly when she vocalises (Flohr and Trevarthen, 2008: 79). Newborns respond with appropriateness to the vocal conversation offered by the parent. In particular, Trehub (2001: 1) proposes that the early capacities to respond to musical experiences are consistent with their status as 'predispositions', a notion which can be considered an inborn capacity to communicate musically.

2.4.5 Musical abilities before and soon after birth

The newborn is well prepared for musical experience. Trehub argues that the infant's ability to distinguish between certain properties of sound is in many ways similar to those of enculturated listeners. Trehub states that 'infants' resolution of pitch and timing enables them to detect the smallest differences that are musically meaningful in any culture' (Trehub 2003: 669).

From an anthropological perspective, Charles Laughlin (1989: 143) establishes the notion that human auditory awareness, the networks for hearing, begin in the uterus, three to four months prior to birth, and Ruth Fridman refers to the maternal womb as the 'first school' (2000: 23). Also, it is confirmed that predisposition supports the ability to learn features of musical structure (DeCasper et al., 1994: 163). Moreover, Jean-Pierre Lecaneut (1996: 24) found that a large variety of acoustical sounds 'emerge from the intra-uterine background noise and are prominent enough to stimulate the fetal auditory system.' A few examples of early exposure to sound are the following:

- John Flohr and Trevarthen write that 'the first muscle activity the central nervous system excites in the embryo has rhythmical timing'; the fetus hears and reacts to the rhythm of music and the mother's voice by making kicking movements (Flohr and Trevarthen, 2008: 78).
- In experiments of prenatal habituation (training), fetuses indicate they become familiarised in an experiment in which pregnant women had to recite a short child's rhyme aloud each day between the 33rd and 37th weeks of their

fetuses' gestation. On hearing a tape recording of the rhyme after birth, a decrease in heart rate indicated that the fetus had become familiarised with the specific speech sounds. In the case of a control rhyme, the heart rate did not decrease, indicating that the stimuli were 'new' to the infant (DeCasper et al., 1994: 163).

- By sucking on a non-nutritive nipple in different ways, two to four day old neonates demonstrated that the familiar sound of the mother's voice was preferred to another female's voice (DeCasper and Fifer, 1980: 1174). However, two day old babies did not prefer the father's voice to another male's voice (DeCasper and Prescott, 1984: 488).
- In a similar procedure, newborns show their learned preference for the mothers' language (which was absorbed prenatally) to a foreign language (Moon, Cooper and Fifer, 1993: 495).
- Newborns had to choose between two recorded lullabies three days after birth. The neonates preferred the option to which they were repeatedly exposed during the end of their fetal life (Satt, 1984, cited in Lecanuet, 1996: 22).
- Newborns whose mothers had been singing a melody using the syllable 'la' changed their pattern of sucking in order to manipulate a repeat of the familiar musical sequence more often than to a recording of an 'unfamiliar' melody with the same notes but different temporal structure (Panneton, 1985, cited in Lecanuet, 1996: 23).

In conclusion, young infants direct themselves to the mother and others with self-motivated behaviour and in this way demonstrate that they are able to engage in meaningful reciprocal communication. On the other hand, young infants experience repeated and integrated episodes of agency, self-coherence and self-history by means of conversation, the expressive amodal behaviour of the mother as well as being in the presence of a musically active mother. Accordingly, the natural motives for mutuality are accompanied by feelings in the form of 'vitality effects', which in turn set in motion the infant's first experiences in music learning.

In this way, the neurobiology of 'sympathy neurones' (Trevarthen and Malloch, 2000: 3) appears to be a primary regulator in the infant's organisation of a sense of an emergent self and a core self. Moreover, the ability to perceive, process and

communicate features of sound is universally apparent even prior to birth, and it could therefore be stated that 'music is an autonomous function' (Peretz, 2006: 25) with biological origins (Lecanuet, 1996: 25; Trehub, 2001: 3). Issues related to the infant's capacity to be in meaningful musical conversation with the other will be discussed next.

2.5 Early vocal communication

> The human voice, as it is always the best, so it would naturally be the first and earliest of all musical instruments […]. [Vocalisations] might resemble the syllables which we make use of in *sol-faing,* or the *derry-derry-down* of our common ballads; and serve only to assist the voice in forming sounds proper to be modulated into melody, and to be lengthened or shortened according to the time and measure of the tune. This rude form of vocal music, as it is by far the most simple and obvious, so it naturally would be the first and earliest (Adam Smith, 1777/1982, cited in Trevarthen, 2008:15).

Infants are well prepared not only for vocalising experiences, but also for reciprocal, social engagement. With the aid of electroencephalography,[13] it has been demonstrated that the cerebral hemispheres of infants, two months of age, already have organs for the recognition of a known person's face (Tzourio-Mazoyer et al., 2002: 454, 460). Vocal conversations start to take place between mother and infant shortly after birth; an event described enchantingly as the mother's 'dance with her infant' (Stern, 1977: 133) and 'two jazz musicians improvising a duet' (Schögler 1999, cited in Flohr and Trevarthen 2008: 70). Starting at around six to eight weeks and lasting at least up to six months of age, vocal bi-directional exchange takes place between the young infant and mother in 'teasing' face-to-face interactions (Stern et al., 1975: 90). The dyad is engaged in a 'non-verbal semiosis of mimetic expression and sympathetic action, which is already distinctly human' (Gratier and Trevarthen, 2008: 122).

The mother speaks in an expressive sing-song style, gazes intently in the eyes of the newborn and responds spontaneously with whole body interaction to the infant's utterances. She moves rhythmically with the infant and 'answers' the infant's vocal

[13] Electroencephalography (EEG) is a technique employed to 'record the electrical activity of the brain using electrodes fixed on the skull' (Gruhn and Rauscher, 2008: 287).

and emotional gestures, in what seems to be responses in perfect conversational timing (Stern, 1985/2000: 16; Jaffe et al., 2001: 13-17). As the conversation proceeds, she creates new sound patterns and excites the infant with the tone of her voice by adapting the contour of her voice (Gratier and Devouchee, 2011: 74), and modulates the pitch, intensity and timbre of her vocal productions (Stern, 1977: 15). She invites the infant to participate in the conversation and mimics the infant's expressive utterances with animated movements (Stern, 1985/2000: 140). What is more, the mother responds musically by paying attention to the pitch contour of the infant's vocalisations, by way of either imitation or variation (Trevarthen and Malloch, 2000: 9). In addition, her performances, in which vocal, facial and bodily gestures are integrated, are temporally organised on a common pulse (Malloch, 1999/2000: 32). Lori Custodero and Elissa Johnson-Green come to the conclusion that mothers are intuitively musical and vocal play is a way in which they experience their 'nature to nurture' (2008: 16).

Mirroring this finding about mothers, infants only three months old show an inborn social nature and musical capacity when they communicate in response to some of the expressive and repetitive musical patterns directed at them (Gratier and Devouchee, 2011: 73-74). During their spontaneous and energetic dialogue, infants meet the mother's gaze, and respond with all sorts of expressive and imitative sound patterns and whole body movements, using face, hands and voice (Flohr and Trevarthen, 2008: 58). What is more, infants respond with inborn musicality (Malloch, 1999/2000: 30) in demonstrating a 'precocious sense of rhythm and interest in the qualities of intention and interest in mothers' sounds' (Gratier and Trevarthen, 2008: 123).

Together, they perform a delicate duet with the whole body. The mutual timing of these bi-directional melodic contours (vocalisations) form expressions of the growing affectionate feeling state between mother and child and for that reason are central to mother-infant bonding (Trevarthen and Malloch, 2000: 3).

2.5.1 The functions of vocalisations

> [I]nfants are responsive to a blanket of human and environmental sound that has enveloped the fetus from the moment when auditory processing became functional in the womb. The learning of culturally transmitted forms of music begins through a process shared with that of learning spoken language, as affective responses to the

> essential components of acoustic phenomena common to both (pitch, duration, timbre and amplitude (Bannan and Woodward, 2009: 466).

For the last 40 years, researchers have observed and developed an understanding of the functional value of the bi-directional vocalising performances of the dyad (Moog, 1976; Malloch, 1999/2000; Jaffe et al., 2001; Trehub, 2003; Trevarthen, 2005; Addessi, 2009; Rodrigues, Rodrigues and Correia, 2009). They have come to the conclusion that both language and music emerge from early vocalising behaviours and that the elements of both mediums are organised into hierarchically, structured sequences by which the specific syntax[14] is governed (Patel, 2003: 674; Hannon and Trainor, 2007: 468).

More recently, the neuroscientist Aniruddh Patel (2003: 679), in using neuroimaging[15] data, substantiated the connection between cognitive theories of syntactic processing in language and music. This theory corresponds with Stefan Koelsch's suggestion that 'the human brain processes music and language with overlapping cognitive mechanisms […] and that 'music and speech are intimately connected in early life (Koelsch, 2005: 211).

Also, from a cognitive perspective, the interaction is identified as a first and crucial step towards music learning and creativity (Barrett, 2006: 201), and from a sociological perspective as an essential building block for the foundation of positive social relations (Jaffe et al., 2001).

Likewise, from the music learning perspective, Gordon advances the notion that young children process the information of language and music in similar, sequential ways. He explains that infants are absorbing sounds in their environment, musical ones included, from an early age. Just as infants go through a stage of language 'babble', they also go through stages of tonal and rhythm 'babble', which can be classified as the child's 'subjective' musical sounds (Gordon, 1997: 25). Hereafter they give meaning to spoken words through experimentation and soon they start to exchange a few words. In the same way, infants give meaning to musical sounds by way of shared vocal and rhythmical behaviours (Gordon, 1997: 4-6). It is in this way

[14] In music, syntax is the orderly arrangement of pitches and duration that establishes the tonality and metre, and in language it is the grammatical structure of language (Gordon, 1997: 121).
[15] Neuroimaging is a brain imaging technique that measures changes in the cerebral concentration of certain blood particularities and is safe for use in young children (Gruhn and Rauscher, 2008: 292).

that I suggest that the expressive quality of vocalisations supports the early acquisition of both speech and music:

> In human beings, vocalizations have developed in two and interdependent directions: the productions of musical expressions of emotion from the first spontaneous songs to highly structured artistic vocal music and the production of verbal symbols from the simplest communicative utterances to abstract symbols in language (Papoušek and Papoušek, 1981: 164).

The phrases 'productions of musical expressions of emotion' and 'communicative utterances', in the above citation, clearly explain the nature of the earliest occurrence of intuitive musico-communicative interaction, the focus of this study. Researchers have identified various developmental functions and meanings of the spontaneous interaction and make use of colourful metaphors to describe it. It is, for example, compared to the musical event of 'counterpoint', with voices 'alternately imitating, leading and supporting one another, contributing to the growth and development of each individual part, meaningful when heard in the relational context' (Custodero and Johnson-Green, 2008: 16). Terms often applied are 'mother-infant dialogue**'** (Spitz, 1965); 'protoconversation' (Bateson, 1979); 'motherese' (Fernald, 1985); 'infant-directed speech' (Papoušek and Papoušek, 1981); 'non-verbal communication' (Stern, 1985/2000); 'babytalk' (Miall and Dissanayake, 2003) and 'prelinguistic alphabet' (Papoušek, 1996b).

I will make use of the more impersonal format of 'infant-directed speech'[16]. It follows that infant-directed speech is the way in which both mother and infant 'speak' in a meaningful way to one another in making use of bi-directional gestures. In the next section an overview is given of the conceptualisation of infant-directed speech across the time span of fifty years.

2.5.2 Infant-directed speech: a synopsis

Rene Spitz introduced the concept of mother-infant 'dialogue' in a suggestion that cooperative exchanges between mother and infant are crucial for the development of cognitive abilities as well as a sense of identity:

[16] Infant-directed speech is further sustained through the singing of songs with a simple structure such as lullabies and playsongs (Trehub, 2001: 7), sung in the same expressive way as in the case of infant-directed speech.

> By far the most important factor in enabling the child to build gradually a coherent ideational image of his world derives from the reciprocity between mother and child. It is the part of object relations which I have called the “dialogue” (Spitz, 1965: 42).

During the 1970s the concept of early vocal communication was for the first time referred to as ‘protoconversation’ by Mary Catherine Bateson (1979). In a longitudinal study, she observed the interactive behaviour of infants over several months and described their vocal play as follows:

> The mother and infant were collaborating in a pattern of more or less alternating, non-overlapping vocalization, the mother speaking brief sentences and the infant responding with coos and murmers, together producing a brief joint performance similar to conversation, which I call protoconversation’ (Bateson, 1979: 65).

More or less at the same time, Stern contributed with an in-depth study on the infant’s first relationship with a partner and their reciprocal, multi-modal (whole body) behaviours. He describes, amongst other things, the extremely long gazing behaviours during face-to-face interaction: ‘They can remain locked in mutual gaze for thirty seconds or more […] [M]others invariably gaze and vocalize at the infant simultaneously’ (Stern, 1977: 18).

From a music developmental perspective, Mechthild and Hanus Papoušek (1981) documented the vocal production of their daughter, Tanya, from the age of two to fifteen months. Their findings have since become a milestone in the study of early vocal musical acquisition (Tafuri, 2008: 13; Español and Shifres, 2009: 93). These findings support the hypothesis of this study that mother-infant interaction maintains the music acculturation processes of the infant. Tanya’s vocal progression was the following:

- at two months Tanya nearly matched a small segment of the melodic contour sung to her;
- at three months she matched a single vocal tone as well as a tone played on a piano;
- at four months she made use of a procedure during which she took turns and responded with a vocalisation of equal duration;
- at eight months Tanya displayed the skill to adapt (to present a variation) of musical material performed by the mother;

- at ten months she imitated short melodies;
- at one year of age she hummed melodies and rhythms of the first phrases of several complex songs (Papoušek and Papoušek, 1981: 194).

During the course of their longitudinal study, the researchers came to the conclusion that the pitch patterns of infant's early vocalisations are similar to the melodic contour of the infant-directed speech in their environment: 'Prototypical melodic contours closely match and model those features that infants learn to control in their presyllabic cooing and exploratory vocalizations'[17] (Papoušek, 1996b: 97).

In a similar vein, Johannella Tafuri and Donatella Villa examined the singing behaviours of infants from before birth across the time span of six years. They assert that '[a] newborn's earliest vocalizations increase in variety and duration if the parents continue to encourage it' (Tafuri and Villa, 2002: 15). Also, Patricia Eckerdal and Bjorn Merker (2009: 250) hold the evolutionary viewpoint that vocal learning is probably 'primed' during affectionate mother-infant interaction.

Stern, Beebe, Jaffe and Bennett advance the notion that reciprocal timing and rhythm during infant-directed speech are essential for attachment behaviours and declare that 'these will be the actual events which organize many of the infant's crucial developmental achievements' (1977: 178). Similarly, Stern (1985/2000: 3) questions the larger context of interpersonal object relations and developmental outcomes by asking: 'How do infants experience the social events of 'being with' another? How is 'being with' someone remembered or forgotten, or represented mentally? What might the experience of relatedness be like as development proceeds?'

In revealing the meticulous timing behaviour of the dyad during infant-directed speech, Jaffe et al. (2001: 116) take the notion one step further in warning against the separation of cognitive development and social interaction:

> Dialogic rhythms are procedures for regulating the timing of face to face communication at age 4 months, and are already analogues of the social-emotional dance-to-be at age 1 year, as well as an index of the infant's novelty response relevant to cognition.

[17] The vocal development during the stage of primary intersubjectivity is in short the following: Infants first learn to control and coordinate breathing and phonation; at two months of age they begin to modulate pitch contours and control vowel sounds (cooing stage), followed by exploratory vocal play from four to six months which consists of, for example, staccato sounds, growling sounds and blowing bubbles (Papoušek, 1996b: 104).

In a similar vein, Trevarthen challenges the claims of cognitive theorists that young infants are unable to imitate others' behaviours (Trevarthen, 2005: 91). Drawing attention to the imitative behaviour of the dyad in the course of infant-directed speech, he explains the merits of newborns' imitated expressions. In describing the innate capacity and intention of the infant to coordinate with mouth, hands and eyes, Trevarthen suggests that infants are ready at birth to engage in 'sympathetic' dialogues, to participate in games of imitation and in this way, learn the signs and symbols of their culture (Trevarthen, 2005: 98).

In an interesting argument, Dissanayake related the developmental and social processes of infant-directed speech to recognised cognitive aspects of art:

> In babytalk, then, mothers […] subtly adjust rhythmically patterned and dynamically varied visual, vocal, and gestural behaviors to the infant's own changing visual, vocal, and gestural expressions of emotional state. These interactions, as just described, display many obvious and intriguing components of what we call the arts (Dissanayake, 2001: 337).

In referring to a 'proto-aesthetic phase' of the temporal arts, David Miall and Ellen Dissanayake state that infant-directed speech regulates cognitive and affective capacities in ways that provide a foundation for the creating and performing of the arts (Miall and Dissanayake, 2003: 337). The prospect of achieving developmental outcomes demands an analysis of the functional features of infant-directed speech.

2.5.3 The functional features of infant-directed speech

The functional features of infant-directed speech are 1) melodic contour, 2) expressive content and 3) turn taking behaviour.

2.5.3.1 The melodic contour of vocalisations

The 'smooth, continuously gliding' melodic contours of vocalisations signify the most prominent feature of the universal occurrence of infant-directed speech (Papoušek, 1996b: 93). The prosodic quality of the mother's and father's voices is almost consistently raised (Trehub et al., 1997: 500). Stern, for example, describes the utterances as 'long stretches of speech in a falsetto range' (1977: 15). Anna Fernald has found that infants in fact prefer high frequencies to low frequencies (1985: 181). Furthermore, variations of 'sentences', 'squeaks and squeals', 'well articulated words'

(one-two syllables) and ‘prolonged vowels’ (e.g. ‘aaaahooooooh’) (Stern, 1977: 15,16) are performed at a smooth and slow tempo (Fernald and Simon, 1984: 104).

Alhough the frequency and variety of the mother’s contour ‘repertoire’ surpass the utterances of the infant, the infant matches in many cases the performances of the mother. Representations of the majority of mothers’ contours are either rising, falling, unitonal, bellshaped or U shaped contours. Also, mothers challenge the infant’s competence and demonstrate their didactical intention by either imitation or repetition of vocalisations (Gratier and Devouchee, 2011: 89). Infants’ repertoire, on the other hand, consists of typically bell-shaped (one third of their production), unitonal, rising or falling contours (Gratier and Devouchee, 2011: 71-73). Gratier and Devouchee come to the conclusion that mothers and infants vocalise ‘with purpose’ (2011: 73) by adapting their own contour according to a specific context, which will be discussed below.

Furthermore, both parent and infant imitate and repeat prosodic contours in the course of their vocal interactions. In adapting the prosodic quality of each other’s vocalisations, Gratier and Devouchee (2011: 71-72) found that a staggering 16.3% of the vocalisations of three month old infants showed the same prosodic contour as a preceding vocalisation by the mother and 6.3% of mothers’ vocalisations had the same prosodic contour as a preceding utterance made by the infant.

Moreover, infants imitate some of the mothers’ most frequently produced contours (Gratier and Devouchee, 2011: 73). It can therefore be deduced that early imitative behaviour between parent and infant is a first opportunity to experience sameness and difference in sounds and sound patterns, a skill that is essential, according to Gordon (1997: 11), for achievement in music. Papoušek (1996b: 96) has summarised the following mechanisms that enable the young infant to imitate sound features shortly after birth:

- infants show a predisposition to respond musically;
- the quality of infant-directed speech affects the emotional state of, for example, arousing (for adequate attention) and soothing (for emotional wellbeing) in a mode similar to the outcomes of music in general;
- the consistent organisation of prosodic contours, as caregiving messages, facilitates infant learning in the everyday context of parent-infant interaction.

It is important to note that although fathers engage in emotional and musical behaviour (such as songs and vocalisations) in a manner akin to mothers' performances, fathers contribute only 14% versus the staggering 74% of the mother's contribution (Trehub et al., 1997: 501). According to Trehub et al., fathers also frequently turn down a request to sing in experimental conditions, whereas mothers rarely refuse (1997: 505). Trehub et al. come to the conclusion that there is a big difference between mothers' and fathers' musical parenting behaviour (Trehub et al., 1997: 505).

2.5.3.2 The expressive content of melodic contours

Trevarthen and Malloch have summarised Papoušek and Papoušek's (1981) theorisation of parents' intuitive behaviours towards their infants as follows:

> [P]arental sympathy for the infant's expressions is the essential external regulator of the infant's cognitive development responsible for the induction of the child into a culture, as well as the modulator of the infant's emotional states of arousal and physiological activity (Trevarthen and Malloch, 2000: 7).

The function of the expressive content of melodic contours of infant-directed speech, according to Papoušek (1996b: 94-96), is to regulate the flux of infants' affective condition as well as cognitive states of attention. In agreement Trehub (2001: 11) suggests that the mother's singing style, which 'remains stable over extended periods of time', maintains infants' attention, engages emotionally with infants and as a result supports in perceptual and social processes.

The mother embellishes her vocal behaviour with exaggerations of intensity, for example she makes use of whispering sounds, exuberant exclamations, *crescendos* and *decrescendos* 'as if she is preparing the infant with adequate experience and exposure to all types of sounds' (Stern, 1977: 15-17). Miall and Dissanayake (2003: 343) suggest that these exaggerated qualitative features of the mother's speech function as 'foregrounding' by which the infant's attention and affection are activated. Thus, it is by way of elaborate vocal expressions and communicative intentions that infants have the prospect of becoming musically acculturated and emotionally regulated, as is shown in the figure below:

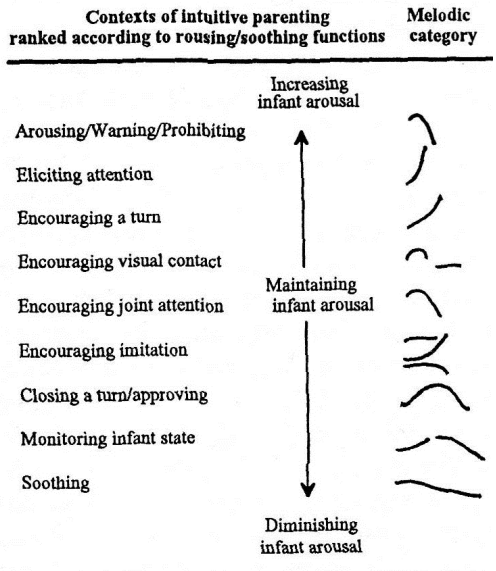


Figure 2: Categorical information of the melodic contours of infant-directed speech (Papoušek, 1996b: 95)

An interpretation of the mother's behaviour according to this figure is as follows: falling contours are uttered to soothe the troubled infants; rising contours to stimulate and maintain their awareness or to invite the infant to take a turn; forceful vocalisations are to express disapproval, whereas sharply falling melodies serve to encourage joint tasks such as turn-taking (Papoušek, 1996b: 95-96).

2.5.3.3 Turn-taking and movement

> [T]he capacity to act at the "right time" is […] essential to the development of the infant's motor skills, perceptual and cognitive abilities […] and [the] development of his or her affective behaviour […] [T]he temporal regulations acquired during childhood may act as a basis for future, more complex learning (Pouthas, 1996: 115).

The mother establishes a regular pulse through the timing of her vocalisations. The infants join in reciprocal behaviour by responding to their mothers' affective speech rhythm contours. Initially, the conversation is typically characterised by the spontaneous fusion of voices, but soon becomes well coordinated by way of 'turn-taking antiphonic interchange' or altering mode (Stern et al., 1975: 90). In fact, infants at the young age of four months already demonstrate a well coordinated sense for the timing of vocalising turns (Rochat, Querido and Striano, 1999: 950).

Very soon the dyad 'become deliberate agents expecting both reciprocity from others and efficacy in their action on objects' (Rochat, Querido and Striano, 1999: 136). It could be therefore assumed that the infant demonstrates an inborn, biologically pre-

determined capacity to coordinate with the rhythmical gestures of a partner (Trehub, 2001: 1-2). Flohr and Trevarthen describe the infant's inborn capacity to regulate the temporal structure of bi-directional conversation as follows:

> The infant's manifest sense of rhythm, phrasing and melody is attracted to the sounds, sights and feel of human bodies, shaped like their own, and moving with expression like their own. Their moving matches that of their affectionately attentive parents and to some extent the music in their environment (Flohr and Trevarthen, 2008: 70).

Pouthas extends this view in suggesting that during each new motor activity, the child has to 'reconstruct notions of order and duration' of earlier actions and these new learning opportunities result in more differentiated temporal behaviour (Pouthas, 1996: 128-131).

Furthermore, the rhythmic format of infant-directed speech is characterised by frequent adjustment of vocal, emotional and bodily gestures. Jaffe et al. describe the temporal structure of the mother-infant dialogue as one of a 'turn taking' format that is edged by 'switching pauses'. They continue that '[t]he switching pause is initiated by one partner, who falls silent, and is terminated by the other, who begins speaking, thus taking the turn' (Jaffe et al., 2001: 14). In demonstrating an astonishing awareness for sympathetic synchrony, each partner pauses for a similar duration before giving a response.

In this way, a sense of good timing is not only the consequence of the infant's inborn capacity to cooperate with others, but also turns out to be engrained with repeated episodes of social exchange. Jaffe et al. explain that the specific features of the bi-directional coordination of patterns become learned: 'the *sequence* of one's own actions, in relation to those of the partner […] becomes automatic with repeated practice' (Jaffe et al., 2001: 29-30). In other words, the stringing together of reciprocal behaviours, the narrative of their conversation, becomes gradually known to both partners.

Accordingly, the dyad's ability to manage each other's attention, to control the activity level of the joint procedure and to exchange the appropriate responses in time, are indicators of the already established cognitive and affective functioning of infants that

have benefitted from repeated coupling episodes (Jaffe et al., 2001: 116). Therefore, it can be suggested that

> [t]he timing of adult-infant dialogue can be conceptualized as a dyadic coordination of rhythms that are modified in changing environments, and that underlie social relatedness, mother-infant bonding, and cognitive processes (Jaffe et al., 2001: 90).

In taking the argument one step further, Jaffe et al. note that affective functioning, or social relatedness, implicates a feeling of attachment[18] that is highly reliant on the appropriate, positive and sensitive performance of the mother. In other words, the joint timing of interactive behaviour becomes a well-known routine only if the mother responds eagerly, in time and according to the infant's developmental abilities and emotional needs (Jaffe et al., 2001: 31). For example, if the mother is remote, if she does not communicate appropriately or does not acknowledge the infant's vocalising efforts, the infant simply cannot create expectations of what will happen next. The mother's sensitive response makes it easy for the infant to identify the boundaries of turn-taking, which is crucial for the rhythmic coupling of the dyad (Jaffe et al., 2001: 14-15).

Thus, the conversation is not just an automatic reflex, but the beginning of intentional communication between parent and infant; the beginning of emotional episodes, structured around narratives with musical content (Gratier and Trevarthen, 2008: 124). In this way, the format in which the dyad manoeuvres their conversation is one of 'delighted, ritualised courtesy and more or less sustained attention and mutual gaze' (Bateson, 1979: 65).

In his book *The First Relationship* Stern (1977) presents a detailed outlay of a mother's sympathetic strategy in order to accomplish shared action between herself and her baby. He writes that the sympathetic mother naturally compensates for the infant's lack of response and 'generally behaves as if he had' (Stern, 1977: 16). He explains that 'the mother waits the average adult dialogue pause length (0.6 s). She then remains silent for the duration of an imagined infant vocal response (0.43 s), and then again waits the average adult dialogue pause length (0.6 s), before speaking again'. He exemplifies this strategy as follows:

[18] Jaffe et al (2001: 31) borrowed from Bowlby's proposal (1958 and 1969, cited in Jaffe et al, 2001) that infant attachment behaviours are used to maintain proximity to and contact with the primary caretaker. In this sense attachment is a mutual construct that describes an intimate and lifelong relationship .

Mother: ‘Aren’t you a cutie?’(1.42 seconds)
Pause: (.6 second)
Imagined response from infant: ‘Yes ‘(.43 second)
Pause: (.6 second)
Mother: ‘You sure are’ (Stern, 1977: 17).

Likewise, the infant is not a passive recipient, but a sensitive partner who cooperates with the whole body. Trevarthen puts this in a few humorous words: ‘Infants show the intention to communicate more than any kitten, puppy or nursling ape wants to do’ (Trevarthen, 2008: 21).

Thus, meticulously timed communication evolves as the result of an interpersonal relationship, which in turn is regulated by inborn systems. The synchronous intuitive systems between infant and mother are rhythmically and vocally adapted to control ‘the seeking of experience’ and to ‘make appeals for parental care’ (Flohr and Trevarthen, 2008: 60).

2.6 Communicative musicality

It is argued that a temporal structure is drawn upon to shape joint acts of emotional belonging. In addition, it is shown that the dyad communicates vocally by adapting a variety of melodic contours. Moreover, research on the development of non-verbal communication in infancy in the last forty years has reported that infants enter the world with an innate motivation to engage in a meaningful way with others. For example, it is proposed that the consistent manifestation of musical content of infant-directed speech provokes features of predictability and attributes to processes of enculturation (Papoušek and Papoušek, 1981: 205), and that the coordination of spontanous mother-infant-dialogue or ‘vocal play’ is a precondition for early social relatedness and cognition (Stern, 1977: 16).

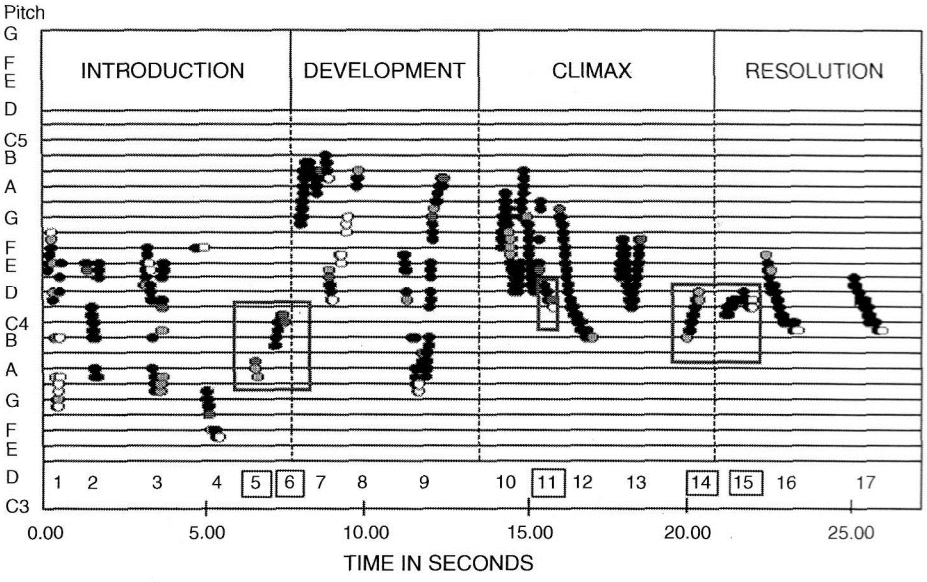
This body of knowledge, according to Malloch, has led to vague perceptions of spontaneous musical communication between mother and infant (Malloch, 1999/2000: 31). Malloch responds with a direct question about the musical nature of mother-infant conversation. He formulated his question as follows:

> It appears that communication is taking place, but communication based in what? The baby cannot understand the meaning of the words the mother is using, and the

> baby often answers in "gliding-type" sounds. The communication must be "held"' by means other than lexical grammar and syntax (Malloch, 1999/2000: 29).

Almost 40 years after Rene Spitz (1965) introduced the concept of mother-infant dialogue, Malloch claimed that the communication referred to in the above self posed question is held by the *ability* to communicate in a musical way. This novel idea has come about by Malloch's analysis of tapes of vocalisations between Laura, a six-week old infant, and her mother, made three years earlier by Trevarthen (Malloch and Trevarthen, 2009: 2). In Malloch's generation of spectrographs[19] of the vocalisations on the tape, he realised that, as a trained musician, 'he began to tap [his] foot [in] feeling the beats as [he] listened to [the] musical sounds'.

Moreover, Malloch identified 'pitch-plots' which could be understood as the combined melodic contour or 'story line' of the conversation. The combined melodic contour (a stringing of phrases) revealed four parts: an introduction, a process of development, a climax and a resolution, illustrated in the following figure:



INTRODUCTION	DEVELOPMENT	CLIMAX	RESOLUTION
1 Come on	7 Oh yes!	10 Tell me some more then	15 Ch ch With INFANT
2 Again	8 Is that right?	11 INFANT	16 Ahgoo
3 Come on then	9 Well tell me some more then	12 Ooorrh	17 Goo
4 That's clever		13 Come on	
5 INFANT		14 Ch ch ch ch With INFANT	
6 INFANT			

Figure 3: The four part structure of the narrative with 'pitch plots', time axis in seconds and mother-infant speech conversation (Malloch and Trevarthen, 2009: 5)

[19] The start and stop of bi-directional vocalisations can be presented by fundamental frequency and overtones on a spectograph (Malloch and Trevarthen, 2009: 2).

In addition, expressive variations of timbre, e.g. the sharpness, roughness and width of sound, became noticable (Malloch and Trevarthen, 2009: 3, 5). These elements are accordingly identified as features of musical communication. This is how the notion of 'communicative musicality' (CM), the general ability to synchronise the rhythm and melodic contour of reciprocal gestures, was advanced. 'The elements of the co-operative and co-dependent communicative interaction between mother and infant combine to make-up what I have called "communicative musicality"' (Malloch, 1999/2000: 31).

With this novel contribution, Malloch has added a new dimension to the natural phenomenon of infant-directed speech. In their article 'The Dance of Wellbeing: Defining the Musical Therapeutic Effect', Trevarthen and Malloch (2000: 3) write:

> An inborn musicality is clearly uncovered in acoustic analyses of parent/infant vocal interactions, where, independent of verbal communication, a shared sense of time and the shaping of jointly-created pitch contours describe phrases and narrative cycles of feeling.

The conceptualisation of infant-directed speech as a reciprocal act of musical communication is a pivotal point in this study. It is self-evident that the day-to day opportunity to respond to elements of musical structure coincides with music acculturation, defined as the gradual absorption of and response to sound in the environment. It can therefore be stated that processes of music acculturation are rooted in the early and expressive non-verbal communication of the dyad.

2.6.1. The structural features of communicative musicality

Communicative musicality, the ability to communicate musically, is structured around three components, namely 1) a temporal framework of repeating pulses, 2) a prosodic contour and 3) narrative cycles of emotion that consist of series of vocal phrases and rests, accompanied by body gestures (Malloch, 1999/2000: 32).

2.6.1.1 The pulse of communicative musicality

Malloch identified a regular 'pulse' (Malloch, 1999/2000: 32) in the mutual coordination of vocal and bodily behaviours of expression, for example coos, syllables, and movement gestures. Furthermore, these expressions are organised in

‘phrases’ or units. Lynch et al. (1995: 3-25) have verified these phrases as 3-4.5 seconds in length.

In this way, a simple patterning of pulses frames the infant’s perception of temporal structure by way of the expectation of what might happen, and when it is going to happen (Stern, 1985/2000: 16-17; Trevarthen, 2002: 11; Gratier and Apter-Danon, 2009: 306).

2.6.1.2 The prosodic quality of communicative musicality

The prosodic quality is the attunement of ‘feeling states’ by way of variations in vocal contours – intensity, pitch and timbre – and expressive body gestures (Trevarthen and Malloch, 2000: 11; Gratier and Trevarthen, 2008: 131; Gratier and Apter-Danon, 2009: 306; Gratier and Devouchee, 2011: 67) during mother-infant vocal play. In employing musical actions, the partners’ individual intentions are shaped ‘in order to [get] across to the other’ (Gratier and Trevarthen, 2008: 131).

The implication is that the mother-infant mutuality assigns a specific emotional quality to the conversation, by way of musical features (Malloch, 1999/2000: 49-50). The mother, for example, will respond ‘musically’ (Trevarthen and Malloch, 2000: 9) in vocalising with a high pitch, in imitating the pitch contour of the infant’s vocalisation, in repeating the vocalisation with a variation, or in matching the expressive timbre of the infant's vocalisation. Likewise, the infant will respond appropriately with musical conduct:

> Infants have considerable capacities for appreciating elements of musical sound, and quite remarkable abilities to time their limited vocal repertoire in rhythmic engagements with an adult who is responding musically (Flohr and Trevarthen, 2008: 58).

In this way a companionship is established that scaffolds ‘vocal development, reinforcing infants’ sense of mastery and pushing them beyond the limits of their repertoire’ (Gratier and Devouchee, 2011: 74). Thus, behaviour of a qualitative nature becomes obvious during the course of infant-directed speech. As in the case of expressive adult-directed speech (normal conversation), infant-directed speech can be described as the expressive exchanging of phrases and pauses.

2.6.1.3 The format of the emotional narrative

Narrative structure, or storyline, is a universal and natural way to exchange thoughts, emotions and ideas. As an oral tradition, the story is always to be found in a specific socio-cultural context (Dissanayake, 2000: 87, 95). What is more, 'telling a story' is an animated performance with whole body interaction by telling and acting with words, inflections of voices, and well synchronised whole body gestures of expression (Gratier and Trevarthen, 2008: 123-124). In this way, the joint behaviour of give-and-take, of perception and response, is intentional in the structuring and expressing of meaning between those who tell and those who listen:

> [T]ellers and listeners must share some "deep structure" about the nature of a "life", for if the rules of life-telling are altogether arbitrary, tellers and listeners will surely be alienated by a failure to grasp what the other is saying or what he thinks the other is hearing' (Bruner, 1987: 21).

It follows that the mother-infant dialogue is an 'instant-by-instant lived experience' (Stern, 1985/2000: xxxv), a joint 'dance of human passion' (Trevarthen and Malloch, 2000: 30), and an event during which meaningful non-verbal acts are sequenced between two partners, and in this way 'indicate a first way in which narrative can be meaningful without words' (Gratier and Trevarthen, 2008: 124).

As already discussed, the prototypical, non-verbal mother-infant narrative is structured as a stringing together of short and repetitive contours, interjected by clear pauses (Miall and Dissanayake, 2003: 340). In this regard, Gratier and Trevarthen (2008: 131) explain that the regulation of sound contours and silences is a behavioural strategy to 'give shape to the sound of heard movement just as pauses give shape to seen movement by imprinting rhythms of alteration'. Furthermore, the repetition of short, simple recurring phrases and one to two syllable words, sustains a 'repetitive, regulating meter around which elaborate melodic, dynamic, and rhythmic variations are interwoven' (Miall and Dissanayake, 2003: 343) and a 'sing-song' quality (Stern, 1977: 15) is attained. The following extract of a sequence[20] demonstrates the repetitive format:

Do you want your own chair?

[20] This extract is part of a sequence recorded in the laboratory of Professor ColwynTrevarthen, University of Edinburgh, U.K., and used with permission by Miall and Dissanayake (2003: 341) in their article 'The Poetics of Babytalk'.

Do you? Liam?
Do you want your own chair?
Is it better? Is it better?
Is it better than that one?
Better than that one?
Is it better than that one?
Yes. Yes.

Malloch (1999/2000: 40) explains that a musical narrative emerges as a result of the *combination* of pulse and music-emotional qualitative 'episodes'. In agreement, Gratier and Trevarthen write that 'jointly created emotional, gestural and vocal movements, over long stetches of time, grouped in longer phrases and episodes, define a narrative with musical structure' (Gratier and Trevarthen, 2008: 131).

In taking the notion of the non-verbal narrative one step further, Trevarthen and Malloch (2000: 1) refer metaphorically to the musical nature of the emotional narrative of the dyad as 'a dance of wellbeing'. The musicality of the mother's passionate voice and energetic gestures not only 'fires the infant's curiosity and imagination' (Gratier and Trevarthen, 2008: 130) and attributes to 'cognitive operations' (Papoušek and Papoušek, 1981: 205), but also regulates the infant's emotional wellbeing in a therapeutic sense:

> Parent and infant make use of the parameters of pulse, pitch-gesture and timbre gesture, so vital to music, to form vocal narratives of shared emotion and experience. When parent and infant are communicating in a way satisfying to both, they are sustaining a co-ordinated relationship through time. In a similar way, we believe, when music therapist and clients are communicating with sounds in a way satisfying to both […] (Trevarthen and Malloch, 2000: 6).

Accordingly, the mother and infant 'share a sense of sympathy and situated meaning in a shared sense of passing time' (Malloch and Trevarthen, 2009: 4). The mutual nature of the contingent relationship, however, is symmetrical as stated in Section 1.1.1. The mother brings her own cultural and emotional disposition that will influence her subjective experience and performance of the lived interactive episode, in a positive or lethargical way (Stern, 1985/2000: 119; Jaffe et al; 2001: 3). It follows that the synchronised format and therefore functional value of the musical narration

between mother and infant can easily be disturbed. Lynne Murray and Peter Cooper (1997: 99) warn that a loss of appropriate rhythmical contingency occurs easily in a communication not satysfying to both. They continue that in the case of depressed and uninterested mothers, whose psychomotor rhythmical behaviour becomes less consistent since it becomes retarded and agitated (Zlochower and Cohn, 1996: 371), the infant's interpersonal response is that of withdrawal and irregular timing.

Interestingly, Gratier (2003: 533) has found that a family's immigration to a foreign country can influence the musical quality, pleasure and companionship of mothers' interactions with their babies. In comparison with mothers in secured cultural contexts, immigrated mothers showed a lack of confidence and as a result, lower levels of timing and interactional synchrony.

Consequently, the developmental outcomes of cognition and bonding are adversely affected by the 'mis-match' and have a negative influence on the child's confidence and ability to learn (Murray and Cooper, 1997: 99-101; Trevarthen, 2008: 25). Indeed, Beatriz Ilari (2005: 657-658) writes that mutuality is complex and is influenced by various social, emotional and economic factors.

2.6.1.4 The format of the cultural narrative

The mother-infant narrative, 'the heart of nonverbal narrative activity' (Gratier and Trevarthen, 2008: 26), is a first and crucial step toward learning 'the music of their mother's culture' (Custodero and Johnson-Green, 2008: 102). Bruner (1990: 56) states that a social event that is not narratively 'framed' will not be remembered.

In the context of mother-infant vocal play, this means that the value of the narrative is not only in the playful synchronisation of affective behaviours, but also in the transmission and learning of 'cultural meaningful contents' (Gratier and Trevarthen, 2008: 136)**.** Borrowing from Bourdieu's notion of 'habitus',[21] Maya Gratier and Giséle Apter-Danon (2009: 304) explain:

> Through ongoing, longterm intersubjective encounters, mother and child learn to sense, through all of their sense modalities, the future trajectories of each other's expressive movements. They acquire what we have called "protohabitus" […] It is

[21] Bourdieu (1977: 78) describes 'habitus' as the representation of procedures and perceptions, formed by way of spontaneous improvisation within a social context.

> variable repertoire of embodied habits rooted in cultural styles that the mother brings with her from her own community of belonging actions.

Carolyn Rovee-Collier (1993: 35) agrees that 'infants' memories of events in which they have actively participated [are] highly enduring and become even more so after repeated retrievals […] and include information about the incidental context in which the event occurred'. In the context of the playful mother-infant duet, the notion of 'incidental' is related to the cultural content of the event, or what the event 'is about'. The event is for example about the temporal structure and the melodic contour of a playful ritual during bathing time, a lullaby or playful singing game.

In showing the value of playing as a way to learn, Blatner and Blatner (1988: 34) claim: 'play is a primal form of learn by doing', a 'holistic integration of many components of learning'. They continue that processes of enculturation, creativity, intellectual growth, and motivation are mediated by playful social experiences (Blatner and Blatner, 1988: 34). In accordance, Lisa Huisman Koops and Cynthia Crump Taggart (2011: 55) write that researchers have found play to be an ideal way for young children to absorb their musical culture early in life. In fact, the shift in the conception of musical parenting, referred to in Section 1.1, is eloquently illustrated by the disagreement between the above-mentioned prospect of play as a developmental strategy and the following remark:

> The rule that parents should not play with children may seem hard but is without doubt a safe one (West 1914, cited in Kessen 1979: 815).

It is clear that the dyad express their sense of belonging by way of musical and playful reciprocy, and that this mutuality is vital for processes of motivation, emotional regulation and cultural learning.

2.6.2 Communicative musicality as an act of musical parenting

Research on infants' capacity to perceive and to learn the musical signs and symbols of their culture has opened up the potential of musical parenting as a natural source of musical experience and development (Papoušek, 1996b; Custodero, Britto, and Gunn, 2003; Ilari, 2005; Addessi, 2009; Custodero & Johnson-Green, 2008; De Vries, 2009).

As a result of social interactive behaviours, a pathway of vocal development can be traced from the second month. Infants start fixing their eyes on their mothers and respond randomly with facial expressions, vocalisations, body gestures and touching (Stern, 1977: 14-19) and the existence of speech sounds (Ruzza et al., 2003: 529).

From three months, in beginning to learn the rituals of gesture play, infants start anticipating and imitating vocal, emotional and body gestures (Juslin and Västfjäll, 2008: 28). Intentional bi-directional behaviour becomes a well known sequence of events, a 'living memory-in-action' (Gratier and Trevarthen, 2008: 133), by which the dyad recall the mutual shaping of emotional gestures and sound patterns, more or less at the age of four months.

From five months onwards, the vocal expressions of the infant become longer, with a great variety in melodic contours, rhythmic and dynamic contrasts and explicit turn taking behaviour as a result of daily exposure to linguistic and musical stimuli (Reigado, Rocha and Rodrigues, 2011: 241, 249).

Around six months, the vocal development of infants has progressed toward the stage of canonical babbling during which vowels are inflected in repeated syllables (for example 'yaya') (Bates and Dick, 2002: 295) and vocalisations contain musical features related to those found in the musical environment (Tafuri and Villa, 2002: 73).

Therefore, I argue that the knowledge regarding the infant's ability to communicate in a musical way announces the universal phenomenon of infant-directed speech as a natural source of musical experience.The outcomes of early social learning from a neurobiological perspective will be discussed next.

2.6.3 The neurobiological pathway of cultural learning: the structuring of the brain through early experiences

Cultural learning in infancy is different from adult learning in that infants learn by way of non-verbal and playful experiences. Moreover, learning in the first six years of life is critical for both emotional and cognitive development (Braun and Bock, 2008: 40-41). For this reason it becomes relevant to discuss a scientifically approved educational strategy, known as brain-based learning or 'neurodidactics' (Gruhn and Rauscher, 2008: 267), in order to explain early processes of music learning.

The concept of brain based-learning verifies that ‘immature, preliminary and unspecific neuronal networks in the brain’ are structured during non-verbal reciprocal experiences early in life; in particular in the part of the brain that has to do with emotional regulation (Braun and Bock, 2008: 27). Neurobiological knowledge explains ‘how’ (Gruhn and Rauscher, 2008: 19) we learn when we learn, and by this way the processing of information in the brain.

2.6.3.1 The processing of information in the brain

Recent sophisticated brain-imaging employing techniques that measure electrical brain responses (Braun and Bock, 2008; Hefer, Weintraub and Cohen, 2009) offer a perspective of the microstructure of learning, which is not possible with the mere observation of early cognitive behaviour (Reigado, Rocha and Rodrigues, 2011: 241).

Actions in daily life are planned, processed and carried out mainly by the prefrontal cortex of the brain (Gruhn, 2012: 2).The cortex constitutes neurons or nerve cells that are interconnected by axons, that carry electrical and chemical impulses between neurons, as well as dendrites that receive these impulses. Through ‘intercellular contacts’ neurons transmit environmental signals that carry multi-sensoric and movement information. Repeated stimulation strengthens the connections and accordingly enhances processes of learning (Braun and Bock, 2008: 30-31).

The transmission of neurons is achieved by electrical as well as chemical signals. In this regard, the outcomes of social learning are of importance given that properties of the limbic system include structures in the brain that are involved with emotion, motivation and the memorision of interactive, emotional experiences. These mechanisms stimulate the production of, for example, the chemical neurotransmitter dopamine (Braun and Bock, 2008: 31, 42). In this way, feelings of positive emotion support the motivation to interact with enthusiasm during mother-infant vocal play as well as facilitating the retention of knowledge (Spitzer 2002, cited in Gruhn and Rauscher, 2008: 19). Moreover, the synaptic contact also stimulates molecular events in the neuron (Braun and Bock, 2008: 31). This means that neuronal networks are transformed as a result of repeated and early learning experiences. It is during these repetitive experiences that learning processes of recognition occur and mental representations (conceptualisations) are constructed by the infant (Gruhn and Rauscher, 2008: 268).

Thus, from a neurobiological point of view, music learning can be seen as the result of a 'pattern-matching' (Gruhn and Rauscher, 2002: 447) process by which mental representations are activated and processed by way of various stimuli. In this way, representations are understood as the mental transformation and integration of many experiences. Mental representations also establish the notion that young children construct their own world, mentally, as will be discussed in the next section.

2.6.3.2 Born to communicate musically

Although Janzen (2008: 287) notes that there is still a lack of research 'that constructs the child as co-constructor of knowledge, culture and identity', Pia Christensen and Alan Prout (2005: 48) suggested that there is a greater theoretical move toward a social constructivism that indicates that young children deal with their own development.

Benjamin Bradley (2009: 263) explains that this new paradigm toward learning was initiated by Habermas's (1970) theory on the potential value of social communication. Bradley explains that Habermas highlighted the physical sociality of human communication that could not be envisioned by Chomsky's (1959) language acquisition device that constitutes communication merely as the control of an abstract system of rules. Bradley continues that Habermas's theory of communicative competence paves the way for 'pioneering researchers on infancy who, since the mid-60s, had been gathering evidence that refuted the then dominant image of the newborn as an asocial information processor' (Bradley, 2009: 263).

In a similar vein, but pertaining to the acquisition of music, Nicholas Bannan and Sheila Woodward (2009: 467) advance the notion that Chomsky's (2000) employment of music and language communication is, from a 'reductive cognitive perspective', because he and his followers fail to appreciate the biologically determined and vital intuitive motives to communicate musically from very early in life. In fact, the auditory competency to absorb, imitate and assimilate features of musical sound has been shown to develop astonishingly early. This early sensitivity to sound demonstrates that the young infant is able to structure presymbolic musical representations of sound before and shortly after birth, as shown in the following examples:

- Newborns are able to detect and discriminate between small differences in frequency, amplitude, and the harmonic spectrum (Papoušek, 1996b: 89).
- In comparison with adults, infants also show innate preferences for sound. For example, infants respond to high frequencies better than low frequencies (Trainor and Zacharias, 1998: 799), such as in the case of infant-directed speech (Masataka, 1999: 1001). By this way perception and learning are accomplished (Fassbender, 1996: 69).
- Infants are sensitive to increments of loudness and seem to perceive timbre and pitch in a manner similar to adults (Fassbender, 1996: 64-68).

Relatedly, Braun and Bock found that infants process new knowledge in prolific ways if compared with the neuronal processing of adults (Braun and Bock, 2008: 27). Also, they warn that synapses are weakened and eventually eliminated from the network if rarely used (Braun and Bock, 2008: 32). Consequently, music learning comes about as a result of plenty and early sympathetic experiences during which sensoric and motor stimuli are perceived, processed and presented by way of neuronal correlates. According to the biological premise,

> music learning is a process by which mental neural representations (genuine musical conceptions) are developed and gradually altered, differentiated, extended, and refined. In order to recognize something as what it is, we activate already established representations. *Procedural learning "*of" music derives from action and must be distinguished from *declarative learning* that consists of verbal information "about" music (Gruhn, 2006: 17).

Thus, music making is fundamentally a matter of procedural knowledge (Elliott, 1995: 53), also in the early, spontaneous procedures of mother-infant vocal play. Musical properties of sound are represented by neuronal connections in particular when activated by 'experience-driven' reorganisation of neuronal networks (Braun and Bock, 2008: 27). As such, the action of performing (for instance imitating a peceived pitch contour) can serve as a 'robust representation' of [the infant's] level of musical understanding' (Elliott, 1995: 59).

Effective learning is very much associated with the non-verbal behaviour of the dyad. For example, Longhi (2009: 195) reports that mothers sing, move and touch their own as well as their infants' bodies frequently in order to provide a temporally coherent segmentation of the musical experience. In response, infants three to four

months of age ‘seem to have a mental representation […] when synchronising significantly more often with certain beats rather than others’ (Longhi, 2009: 195).

Also, exposure to a specific environment creates ‘culture-specific’ brain structures and representations (Hannon and Trainor, 2007: 266). Examples of such representations could be the infant’s first detection of consonant intervals (Trainor and Heinmiller, 1998: 77), the early attempts to ‘match’ pitch contours of utterances (Papoušek and Papoušek, 1981: 185) and the acculturation of a specific repertoire of maternal songs and singing games with a specific temporal structure (Gordon, 1997: 1; Trehub, 2003: 671; Bargiel, 2004: 1). From a developmental perspective, early cultural learning takes place in the intimacy of the natural environment:

> A baby’s selective orientation to musical sounds, critical discrimination of musical features of sound, and vocal and gestural responses that are timed and expressed to contribute to a joint musical game confirm that music […] is clearly a cultural achievement of human society (Trevarthen, 2002: 21).

Thus, from a neurobiological perspective, experiences that occur early, frequently and are of a practical nature are of vital importance for early music learning. Gordon concurs that ‘[t]hose who have taught children […] know that our potential to learn is never greater than at the moment of birth, and after that it gradually decreases (Gordon, 1997: 1).

2.7 Mother-infant conversation: the beginning of artistic ways

It is generally accepted that art, as an aesthetically organised form of expression by way of ‘elaborate’ procedures (Dissanayake, 2001: 341), appears to be a product of culture. Art, however, should also be regarded as a biological adaption that evolves from the dyad’s intuitive need to express their bond in sound and movement. In accordance, Stern (1977: 133) has observed and analysed the creative processes of the dyad in the course of infant-directed speech as follows: 1) the partners improvise unexpected behaviours ‘on the spot’, 2) they naturally create and change temporal patterns and perform sequences that ‘never have been performed exactly like that before’ and 3) they intuitively adjust to pitch, tone, timbre, tempo and modality.

Also, it seems that the spontaneously creative behaviour of the dyad is rooted in the emotional need to express mutuality by way of sound and movement. In fact, Dissanayake asserts that the mother-infant duet is not only the beginning of culture,

but already a cultural construct. She indicates that there is a similarity in the intentional format of mother-infant narrative, and the premeditated, artistic ritualisations of pre-modern societies. She explains that the creative devices to elaborate the lived narrative in both cases are 'repetition, accentuation, theme and variation[22], anticipation, surprise, and often (if not always) building to a climax with eventual resolution'. Moreover, features of 'interest, attention, communication, memory, and emotion' (Dissanayake, 2000: 142) stir up excited feelings of companionship. She notes that these early developmental processes, which she refers to as 'aesthetic incunabula', are the same as the artistic operations of artists (Dissanayake, 2001: 336). Miall and Dissanayake (2003: 356) write that it is from these early beginnings that communities 'have gone on to create their myriad elaborated forms' of artistic expression.

Dissanayake continues that in addition, these early creative beginnings proceed by way of 'enculturation', 'finding a sense of life meaning', 'developing competence for life' and eventually 'engaging in the elaborating of experiences' that we now call the arts (Dissanayake, 2000: 7). It is from the 'hands-on competence' (Dissanayake, 2000: 99) of singing and creating songs, playing and improvising games, telling and elaborating on stories that the happening of art evolves:

> Art uses symbol, as it uses anything – systems, stories, objects , events, ideas – as an occasion for showing care and concern by elaborating [...] human minds had cognitively evolved to a stage where they believed that extraordinary efforts would better assure good outcomes (Dissanayake, 2000: 149).

Drawing on systems views of creativity, Barrett (2006: 201) states that the development of young children's musical creativity evolves from early human interaction. In drawing on Dissanayake's idea that culture making takes place as a result of the capacity to elaborate, Barrett (2006: 210) explains that young children's early spontaneous improvisations, known as 'invented songs',[23] are in fact generated from infant-directed speech.

[22] Mothers intuitively use vocal variation so as to support infants' vocal development (Gratier and Devouchee, 2011: 74).

[23] Spontaneous songs emerge as components of children's musical play at about eighteen months of age and are maintained to the age of seven years (Barrett, 2006: 202).

Thus, the roots of creative behaviour evolve from the dyad's reciprocal behaviour, a conception to which Custodero and Johnson-Green refer as 'passing the cultural torch' (2003: 102). In accordance with Gordon, who asserts that parents have a crucial role to play in their young children's understanding of the music of their culture (Gordon, 1997: 3), I argue that the foundations of cultural development are to be found in the earliest narrative of belonging, in being involved in an emotional-musical matrix from the moment of birth.

2.8 The sense of a core self (ii): self with other

It is by way of repeated interpersonalised events, explicitly processes of 'prediction' and 'anticipation' (Jaffe et al., 2001: 1), that the infant develops a sense of 'being with an other' (Stern, 1985/2000: 100). It is thus clear that the infant is deeply rooted in experiences that change his/her ongoing subjective experiences. The infant will certainly not experience a feeling state, 'neither in its cyclicity, in its intensity, nor in its unique qualities' (Stern, 1985/2000: 102), or be motivated to create musical ideas as described by Dissanayake, without the company and conversation of a partner. Simply put, it is by way of spontaneous, emotional and interactive experiences that the infant's emotional and cognitive world is regulated and skills developed to be a musical partner.

As a partner, the infant co-constructs the mutual narrative by imitating the mother's expressive sound patterns and responding with good rhythmic timing to her acts of affection. In this way, the infant is linked to the other by way of 'other-centric participation', a process that Stern refers to as 'self-resonating with another' (1985/2000: xxiii). Before long, the vocal communication between mother and child contains specific musical features similar to those found in their musical culture (Papoušek, 1996b: 90; Tafuri and Villa, 2002: 73; Addessi, 2009: 764-765).

Considering Gruhn's claim that conscious neuronal activation may be called 'audiation' (Gruhn and Rauscher, 2002: 456), I suggest that repetitive episodes of mother-infant vocal play are the roots of ongoing processes of audiation, and that the infant is an active agent in the construction of the process.

2.9 Conclusion

The young infant is capable and motivated, from the moment of birth, to synchronise its whole body movement to the vocal, emotional and body gestures of a partner. The

coordination of the dyad's non-verbal gestures is described as narratives of belonging and a perfect opportunity to organise a subjective perspective of the self and the other.

On the other hand, the early, reciprocal mother-infant vocal play is fundamentally a music acculturation process by way of affective communicative behaviours. The conversation between mother and infant occurs frequently, over a long period of time, maintains the exchanging of meaningful emotional and cultural content, and is of a practical nature. Accordingly, the intuitive event is vital for the activation and development of early musical representations; the neuronal correlates of procedural knowledge or processes of audiation.

CHAPTER 3: Intersubjectivity as a Pathway of Development

3.1 Introduction

In drawing on *inter alia* Vygotsky's notion of the 'intermental',[24] Stern brings the 'quantum leap' of intersubjective relatedness to the fore as a mother-infant coordination of attentional, intentional as well as emotional gestures. Co-awareness emerges in that the infant becomes conscious that events and objects are shareable with others (Stern, 1985/2000: 128). Trevarthen, approaching this notion from a different angle, sheds light on the nature of intersubjectivity as the intuitive need to relate and respond to the minds of others:

> The terms that have become habitual belie the necessary sympathy that is uniquely interpersonal. From the start, human relating is not at all "objective" […] What matters is the sentiment – the sympathy of feelings implicit in how the impulse to relate is transferred, within each mind according to its state of alertness and coherent agency (Trevarthen, 2005: 102).

As stated before, the infant is not an 'empty vessel' to be 'filled' by others with skills and knowledge. Indeed, the infant determinedly 'sets a course toward meaning by trading mimicry with sympathetic known companions' (Trevarthen, 2005: 96-97). In order to communicate emotional states, to prepare for speech, playful creativity and 'culture making' (Papoušek, 1996b: 91), the young infant needs an intimate other to imitate and to be imitated by. Schutz (1962, cited in Gratier and Apter-Danon, 2009: 309) explains that an interpersonal relationship is established by the 'reciprocal sharing of the Other's flux of experiences in inner time, by living through a vivid present together, by experiencing this togetherness as a "We"'.

In the revision of his book written 15 years before, Stern adapts his outlay of the development of the senses of self and specifies that the onset of intersubjectivity is indeed at birth and not at the later age of seven to nine months, as he had first suggested (Stern, 1985/2000: 124). He explains that his comprehension of the

[24] Russian psychologist Lev Vygotsky (1896-1934) distinguished between intramental and intermental abilities in children as an important component of his constructivist approach to learning: 'Every function in the child's cultural development appears twice: first on the social level and later on the individual level; first, *between* people (*interpsychological*) and then *inside* the child (*intrapsychological*)' (Vygotsky, 1978: 56). The terms in Vygotsky's original Russian that are here translated with *interpsychological* and *intrapsychological* are also often translated with *intermental* and *intramental* (Wertsch and Rupert, 1993: 228); Stern follows the latter tradition.

infant's capacity to share acts, feelings and attention was influenced by new neurobiological research regarding the early onset of imitative behaviour. Research has shown that the capacity for early imitative behaviours is set off by the function and potential of mirror neurons (Stern, 1985/2000: xxi).[25]

An extraordinary example of early imitation is the moment-to-moment documentation of a two-day old's responses by a young doctor, Emese Nagy (Nagy and Molnar, 2004: 54). In making use of heart rate procedures, she found that the newborn demonstrates capacities for early imitative responses. What is more, the newborn also displays the motivation to engage and even to 'provoke' a response from a partner. Another astonishing finding is that of Kugiumutzakis et al. (2004: 175-179) who have shown that infants, within a few weeks, match simple vowel sounds of differing timbre as well as the rhythm of a short group of repeated sounds, and do it with playfulness and expression. In a similar vein, Miall and Dissanayake have established that the onset of early intersubjectivity is indeed clearly observable in a two month old's motivation and mental ability to interact, which in turn 'precedes and provides scaffolding for subsequent attachment':

> Through detailed analysis of a transcript of a mother's dialogue with an 8-week-old baby we show that babytalk displays remarkable and systematic features that serve to create and maintain interpersonal coordination (Miall and Dissanayake, 2003: 338).

3.2 Secondary intersubjectivity: self with a resonating other

In view of Stern's recognition of the infant's ability and motivation to imitate aspects of a companion's behaviour from the moment of birth, it becomes necessary to show the correspondence with Trevarthen's (1979) conceptualisation of intersubjectivity, which consists of two hierarchical levels: 1) *primary* intersubjectivity from birth to nine months, followed by 2) *secondary* intersubjectivity. Beebe et al. (2003: 789) have summarised the stages of intersubjective development according to Trevarthen as follows:

> Whereas "primary intersubjectivity" refers to the coordination of self and other based on correspondences of form, timing, and intensity "secondary intersubjectivity"

[25] Rizzolatti and Arbib (1998: 1888) bear out that the visually observed actions of a 'doer' are neurologically represented in an onlooker's brain by way of a resonating 'mirror system'. Wolf et al. (2001: 104) extend the theory in suggesting that the observer is also in the position to recognise the intention of the 'doer' and the functioning of the system can thus been seen as a 'biological correlate' for the reciprocal coordination described by Stern and others.

> includes an object and refers to the intercoordination of self, other, and object based on the cooperative exchange of referential gestures.

In spite of the similarities with Trevarthen's proposal, Stern maintains in his review that a 'secondary intersubjectivity', or what he calls *self with a resonating other*, can be observed in a *changed* emotional and intentional quality of the infant's behaviour (1985/2000: xxii). Stern's view of intersubjectivity places particular emphasis on interaffectivity, on sharing subjective experiences, an intersubjective format that he terms 'affect attunement' (Beebe et al., 2003: 824).

Accordingly, Stern identifies three distinctive behaviours of secondary intersubjective relatedness. These are 1) sharing the focus of attention, 2) sharing intentions and 3) sharing affective states (Stern, 1985/2000: 128-132). These will be discussed in the following paragraphs.

3.2.1 Sharing the focus of attention

Stern (1985/2000: 29) specifies that around nine months of age the infant starts to cooperate with interest and palpable attention to others and to objects in its immediate environment. Flohr and Trevarthen (2008: 80) concur that, at this age, '[i]nfants start to deliberately look and point to and indicate a direction of attention and show signs of wanting to participate in the attentions and intentions of others'.

In this regard, I apply Swanwick and Tillman's (1986: 305) well-known helical model to exemplify the sharing of attention. After observing the compositional processes of children and the aspects of mastery, imitation and imaginative play, Swanwick and Tillman describe a developmental process of the growth of children's musical knowledge from birth to more or less fifteen years. In short, they describe musical development as the assimilation and accommodation processes of four hierarchical levels: 1) handling of materials, 2) expression given to sound, 3) exploration of structural possibilities and eventually, 4) personal commitment to specific musical statements (Swanwick, 1994: 86-87).

It is during the course of the first developmental level, the manipulative level, that non-verbal infants become interested in the pleasure of sound itself (Boyce-Tillman, 1996: 55-57). They are passionately involved not only in the producing of 'squealing and growling sounds, screams and whispers, brief *staccato* noises, and drawn-out vowel like sounds' (Papoušek, 1996b: 104), but also in sound-making with objects.

Accordingly, they explore through the senses by looking at an object, touching it, licking it, smelling it and listening to it. With the sensitive support of a companion they pay more and more attention to the object and eventually manage to manipulate it.

In order to give a real life example of this exploration of environmental sounds, I borrow extensively from Maria Seeliger (2005: 89-90) in her moment-by-moment narration of the act of sharing attention:

> A ten month old infant sees a drum and is fascinated by the new object. The infant looks at the drum and directs attention on the object. The infant looks alternatively at the drum, at the mother, at the drum and again at the mother. The infant wants the mother also to fix her attention on the new object. In addition, the infant senses own thoughts and on what they are fixed. The infant also senses that the mother has thoughts too, which could be the same or different and so the child notices the non-verbal counter play between its attention and the attention of the mother.

It should be mentioned that the infant's altered sense of agency at this stage also influences the parent's intuitive musical parenting style and choice of musical activities such as engaging in Action Songs, although such an observation lies outside the scope of this study.[26]

3.2.2 Sharing intentions

Stern identifies an altered capacity in the infant's ability to share own expectations with the other. This behaviour is evident in the intentional behaviour to 'have something', or to request an act of involvement (Stern, 1985/2000: 131). For example, the infant utters expressive protolinguistic sounds such as 'Eh! Eh!', which are accompanied by exaggerated body and facial gestures in requesting to be moved again and again on the beat of rhythmical music, or 'asking' for a favourite song to be sung again. This is how the infant communicates without words in an interpersonal relationship. It follows that a perception of the self now includes not only conversational consciousness as described before, but also the motivation and cleverness to 'guess' what is going on in the other's mind ('dancing'); to 'manipulate' the other and so take part in a creative 'empathic process […] bridging the two minds'

[26] 'Action songs combine 'melody, words and schematized sequences of obligatory bodily action (such as knee jogging, hand clapping, finger games and pantomime) into a narrative sequence that provides scope for the infant to participate in predictable ways in interaction with an adult' (Eckerdal and Merker, 2009: 250). *Itsy Bitsy Spider* is an example of an action song.

(Stern, 1985/2000: 126). It follows that the concept of 'sharing' should be understood as the exchanging of mental states. Trevarthen agrees with this notion:

> For infants to share mental control with other persons, they have two skills […] First they must be able to exhibit to others at least the rudiments of individual consciousness and intentionalilty. In order to communicate infants must also be able to adapt or fit their subjectivity to others – they must also demonstrate intersubjectivity (Trevarthen, 1979: 322).

3.2.3 Sharing affective states

As explained before, during the early months the mother echoes or 'mirrors' the young child's vocalisations and gestures and this response evokes a response in the young infant. However, the empathetic response does not reflect *shared feeling states* and therefore is an attribute of primary intersubjectivity*.* Also, the readiness to share an idea in the mind such as the intention 'to be danced' is a process in the subjective emotional domain (Stern, 1985/2000: 130).

Stern insists that the only way that affective experiences enter the intersubjective realm is by way of the communication of affective states, an interpersonal condition that he identifies as *affect attunement.* Stern (1985/2000: 142) suggests that *affect attunement* is not the matching of another person's behaviour *per se,* but is indeed some feature of the behaviour that reflects the person's feeling state that is being matched. For example, if the infant vocalises cheerfully an ascending musical phrase, the mother responds with an arch-like movement of her head and in so doing the infant gets the message that they are on 'emotional terms'. If the mother (only) echoes the infant's utterance as stated earlier, she would have imitated the 'form'. However, in the case of her amodal behaviour, the attunement of feeling states becomes involved.

> To mimic another implies we are attentive to his or her behaviour. However, to abstract a communicative motive from that movement and to relay it back to the initiator in a changed yet emotionally appropriate form, implies we are not simply mimicking, but creating an attitude or evaluation of what has been given to us by the other (Trevarthen and Malloch, 2000: 12).

Stern offers the example of an excited nine month old girl reaching for a toy. As she grabs it, she lets out an exuberant 'aaaah' and looks at her mother who performs a

terrific ‘shimmy’ with her upper body which is the same duration as the aaaah but is equally excited, joyful and intensive (Stern, 1985/2000: 140). It is clear that time (the duration of the aaaah), form (the ‘shimmy’) and intensity (the excited feeling state) is essentially part of this joint coordination. Accordingly, Stern (1985/2000: 139) prescribes the conditions for affect attunement as follows:

- the mother should be able to understand the infant’s feeling state from the infant’s expressive act;
- the mother’s performance should match the infant’s explicit behaviour;
- the infant should be able to draw a parallel to its own feeling experience, not only processing the performance as an imitation in form.

Thus, the infant should be able to transfer information received in one sensory modality in some way to another. Stern (1985/2000: 146) continues that attunement is promising in those behaviours that could be ‘mirrored’ without imitating them in form. In their comparison of different theories of intersubjectivity in psychoanalysis, Beebe et al. conclude that Stern and Trevarthen share the notion of interpersonal coordination as an event that takes place in the coherent senses of *time, form* and *intensity*. They understand the process as follows:

> Patterns are entrained in time, imitated in form, and brought into register in intensity range. This intercoordination of inner states between subjects enables each to resonate with or reflect the other. 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., 2003: 787).

Affect attunement of time, form and intensity is therefore a showcase of the feelings of attachment that develop between mother and child. It is the evidence of their intersubjectivity that results from early imitative behaviour.

3.2.4 The musical function of affect attunement

The purpose of this study is to describe a pathway towards audiation that is rooted in the co-construction of attunement and cognition in the early months of acculturation. Seeliger’s (2005: 21) novel contribution that the evidences of affect attunement (*time, form* and *intensity)* are analogous to the elements of music is extremely useful for tracing the non-verbal pathway. Accordingly, evidence for attunement (*time, form and intensity*) is embedded in the non-verbal, musical communication between mother

and infant. The mother and infant demonstrate the capacities to initiate and perceive such evidence. The following are a few examples of spontaneous musical-interactive behaviour, which occurs 'out of awareness and almost automatically' (Stern, 1985/2000: 145):

- the mother spontaneously gestures with a gracious arm movement the *timing* of the infant's short or long vocalisations, or nods enthusiastically in time with the infant's effort to make music with a musical rattle;
- the mother matches *levels of intensity* in the sensitive touching of the infant's body parts during a singing game, or in the excited accelerations of action games, or in vocal crescendos in order to match an awkward movement made by the infant;
- the mother matches *form* with graphic gestures that mirror the infant's melodic contours, or indicates turn taking during reciprocal conversations;
- the infant also demonstrates the ability to perceive evidences of intensity, form and time.[27]

Thus, the communication of music is clearly embedded in the interpersonal relationship between mother and infant. The first relationship could for that reason be seen as the foundation of an implicit form of musical knowledge. It follows that a first way to acquire musical knowledge is an act of affect attunement during the years of infancy:

> Belonging is implicit knowing that takes into account the cultural tones of every individual's way of moving and meaning. Mothers and infants make sense […] through musical narrative forms (Gratier and Apter-Danon, 2009: 311).

Accordingly, the intersubjectivity between mother and infant lays not only the foundations for social functioning, but also for cognition, as will be discussed in the next section.

[27] Trevarthen and Malloch (2000: 13) relate an especially moving real-life event to illustrate the infant's attunement capacities: a five-month old baby who had been born totally blind was observed to perform actions with her arms and hands in attunement to her mother's singing of Swedish baby songs: 'Performing gestures that creatively complement the mother's song, she raises her arm and spreads her fingers as the verses swell in excitement and drops her closed hand at the wrist when a stanza ends'.

3.3 Conversation as a way of knowing

I propose that the matching of feeling states across modalities as discussed in the previous section, as well as turn-taking exchanges as discussed in Section 2.5.3.3, contribute significantly to the infant's development as a 'first way of knowing'. This early format of cognition, which can be defined as procedural knowledge,[28] is generalised and stored in the course of the day-to-day emotional, interactive encounters of the social environment:

> Through repeated interactions of everyday procedures […] fundamental "modes of development" […] become organized according to procedural knowledge. They can be thought of as becoming organized over time according to different developmental pathways in infancy. One such pathway concerns an internalization of a patterning of emotions (Emde, 1992: 34).

Jean Piaget's cognitive development theory (1951; 1970), which has had a huge impact on the understanding of cognitive processes for several decades and finds general support in literature regarding cognitive development, also in application to spiral models of musical development (Swanwick, 1994: 96-98), does not, however, account for the role of emotions and social factors on thinking and learning at all (Bannan and Woodward, 2009: 470). Piaget's model, in which development is separated in four internal stages of biological growth (*per se* an intrinsic scaffolding of development), propagates the notion that 'development precedes learning' and that development is dependent on the establishment of prerequisite structures (Jordan-Decarbo and Nelson, 2002: 212).

An example of Piaget's influence is the sequencing of internal mental processes[29] identified by scholars in the field of early childhood education (Sonnekus and Ferreira, cited in Grobler 1987: 14-17). It is clear that this proposed learning process does not account for either the role of mutual coordination, or the important issue of inborn musical abilities in the conceptualisation of cognitive development.

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[28] In the context of this study, procedural learning refers to the preverbal stage of knowledge acquisition, during which the infant learns from the surroundings in a non-verbal and non-analytical way (Mosby's Dictionary of Complementary and Alternative Medicine, 2005). In this sense, procedural learning is unconscious learning through the repetition of actions.

[29] Cognitive development is described as the mental processing of sequential learning modes: 'sensing', 'attending', 'perceiving', 'representing', 'thinking' and 'memorizing'. The substantial role of intuitive musical communication is therefore not considered.

Stern (1985/2000: xii), a pioneer in both the fields of psychoanalysis and developmental psychology, is emphatically critical of the categorical sequencing of age-related stages identified by Piagetian psychology. In focusing on the developmental functions of reciprocal relations, Stern points out that a theory that only reflects on internal stages of biological growth does not account for the emotional and social influences on the development of consciousness or theory of mind.

Stern continues that learning is co-constructed from the 'patterned experience' and subsequent gradual representation of self in interaction with another (Stern, 1985/2000: xv). In educational reality, it is the 'moment-to-moment' (Stern, 1985/2000: 137) multi-modal and emotionally coloured procedures that constitute the infant's awareness of the world. Bannan and Woodward (2009: 472) agree with Stern on this point:

> The infant becomes involved in assigning and declaring meaning alongside emotional responses in a complex semiotic traffic of *perception* and *production* in which the integration of sound, touch, and visual cues with movement responses characterizes experience of stimuli.

Trevarthen and Malloch (2000: 13) approach the issue from a different angle in warning that not only the influence of prevailing conceptualisation of cognitive processes of the last half century, but also new knowledge regarding the neurobiology of learning 'gives a partial, and reductive, explanation of the role of communication, and music in particular'. In this context, the role of communication is the intentional sharing of emotional, interactive procedures that take place in a social environment, or the experience of communicative musicality, as is discussed in Section 2.6.

3.4 The influence of the social environment

Margaret Boushel, research review editor for *Child and Family Social Work*, states in her introduction to John Barrett's *New Knowledge and Research in Child Development* (1998: 267) that '[o]ne of the important contributions of recent research has been to question aspects of the 'stages' model of development […] [O]ur approach needs to focus both on improving the environment in which children find themselves and on the respect and support we accord to children as actors in their

own lives, as they go about the task of constructing their own development'. In other words, assumptions that 'underestimate children and treat them as stereotypes of ages or stages rather than as individuals and persons' (Barrett, 1998: 274) do not account for cultural learning as a socially mediated event. Marguerite Barker-Reinecke (2007: 204) draws on the constructivist approach of Vygotsky as discussed in Section 3.1. She explains that

> everyday living and consequent social interaction are transformed into the socio-cultural education of the child. The learning and development assisted by the care-giver, usually a parent, allow the "natural" biological structures, which in this case are responses, reactions and environmental control, to be mediated towards a cultural basis.

In this regard, Gordon's view on the musical development of the individual corresponds in a remarkable way with the constructivistic approach:

> Young children require assistance in learning to decode the music of their culture […] young children who lack […] unstructured informal guidance [done by the parent] directed at helping them to work through the music babble stage, will never attain optimal music achievement (Gordon, 1997: 13).

John Barrett writes that '[a]lthough intrinsic development processes are of course still an important part of the story, the balance between intrinsic and extrinsic influences has been reset with much more emphasis on the extrinsic' (Barrett, 1998: 268). He states that the continuity of developmental processes is ever-increasingly being supported by longitudinal multivariate research, and as a result 'the stages approaches have lost ground as methodology has improved'. He also states that 'lifespan continuity of the ability to benefit from *opportunities* for learning is now well supported […] Cognitive development is never just the intrinsic maturation of processes in an individual' (Barrett, 1998: 267-271).

This means that learning often takes place from repeated opportunities and from acquiring relevant, rich and various experiences in interaction with others. Barrett (1998: 268) continues: 'as stage models have become less useful, models which allow more precise classification and measurement of the environment have grown more necessary'. One such model, a pioneering and influential reference in developmental science, is Bronfenbrenner's *The Ecology of Human Development: Experiments by Nature and Design* (1979). Bronfenbrenner's systems approach

depicts the environment as a system of environments nesting, ‘like a set of Russian dolls’, one within the other (Bronfenbrenner, 1979: 3). His approach states that all possible influences are present at all times, only with different impact, and ‘what matters for behaviour and development is the quality of the environment as it is perceived subjectively, and not as it may be in ‘objective reality’’ (Barrett, 1998: 268).

Bronfenbrenner writes that In the life of the infant, the most intimate circle of the systems approach is called the ‘microsystem’ in which the quality of daily face-to-face interactions with parents, family and friends, and for example, a rich musical environment, with frequent and positive interaction, have direct influence on learning and development. A set of microsystems (including for example musical activities in the neighbourhood and church) frames a child’s personal world, and forms collectively a ‘mesosystem’. Those environments which indirectly affect a child, for example the mother’s working hours, available time to communicate musically or financial means to attend a music programme, are called ‘exosystems’. Cultural influences, for instance styles and genres of music played on the television and radio, are called the ‘macrosystem’ (Bronfenbrenner, 1979: 3-8).

As said before, these influences are ubiquitous and consubstantial. Instead of regarding development merely as a scaffolding of intrinsic competencies, Bronfenbrenner’s developmental approach indicates that ‘[i]t is the environment as attended to, perceived, interpreted, assimilated and remembered which influences development’ (Barrett, 1998: 269). Thus, in contrast to the stages model that reflects on internal stages of biological growth, an ecological model incorporates influences of the immediate environment in processes of music learning. These are external factors such as the musical background, motivation and preferences of the mother to communicate musically with the infant, the absorption of music on the radio and the quality of music programmes attended.

In later reworkings (Bronfenbrenner and Ceci, 1994; Bronfenbrenner, 1995; Bronfenbrenner and Morris, 1998), the functional structure of the original model was extended and a more complex version is eventually presented in the format of a ‘bioecological model’ (Bronfenbrenner, 1999: 4). This means that the researchers also reflected on the learning processes that emerge from the child’s interaction with the environment. As such, both biological and environmental developmental factors unfold as a convergence between nature and nurture. This means, for example, that

in maintaining the musical aptitude with which the child is born, nurturing should commence as early as possible. Gordon provides the following example:

> Consider two children born with the same level of music aptitude. The child who experiences a rich music environment at six months of age will ultimately demonstrate a higher level of music aptitude than the child who experiences a similarly rich music environment at eighteen months of age. […] [T]he effect of a fertile music environment on a child's music aptitude decreases at an increasing rate as the child grows older, making the importance of an early and appropriate music environment inestimable (Gordon, 1997: 10).

In describing the bioecological dimension, Bronfenbrenner (1999: 4) postulates that a vital distinction should be made between environments *per se*, and the environment as the central feature of a continuing *process*. So, the continuing *process* becomes a central feature of development and is 'defined in terms of its functional relationship both to the environment and to the characteristics of the developing person' (Bronfenbrenner, 1999: 4). For that reason, for development to occur, distinctive properties of processes are defined as follows:

1. The person must engage in an activity.
2. To be effective, the activity must take place on a fairly regular basis.
3. The activities should take place over an extended period of time.
4. The activities should become more and more complex.
5. There must be reciprocal communication of meaningful content; developmentally effective processes are not unidirectional (Bronfenbrenner, 1999: 5-6).

It is obvious that the proximal processes[30] needed for the transformation of development correspond on every point with the described format of the mother-infant duet. Also, Gordon's theory of music learning corresponds with all these preconditions. Gordon specifically recommends that parents should initiate musical activities on a daily basis (Gordon, 1997: 43), engage interactively with their young children in moving, listening, creating and singing procedures (Gordon, 1997: 45-50), engage in the reciprocal coordination of rhythmic and melodic patterns that become exceedingly more complex (Gordon, 1997: 62-65) and guide their infants from the

[30] Bronfenbrenner describes the ongoing interaction in the personal environment as proximal processes (1999:5).

moment of birth, followed up by structured guidance with the imitation of patterns (Gordon, 1997: 2-4).

Thus taking the value of ongoing, interactive processes into consideration, there is a need for a paradigm shift: to discard evaluating development according to neatly demarcated stages; and to rather regard development as a system wherein co-constructors are equally responsible for acculturation and learning; where there is no cause and effect, but rather a consubstantiality that has to be nurtured from as early an age as possible (Gordon, 1997: 44).

Likewise, in evaluating the ecological implication of early social learning in view of musical development as a spiral, Bannan and Woodward interpret the pathway of musical development in a way similar to Bronfenbrenner and Gordon, namely that 'acquisition of musical behaviour is a process that transforms both representation, to the self, and communication, with others' (Bannan and Woodward, 2009: 471). Furthermore, they argue that Swanwick and Tillman's (1986) prevailing spiral of musical development (which resembles Piaget's stage model) does not account for the infant's capacity to engage in multi-modal, intuitive and intentional musical communication with the mother.

> An infant masters expression of sounds that he or she makes instinctively and then adopts a rich variety of sounds, "transforms representation" initially outside his or her control, which are elaborated in spontaneous solitary play and through interaction and learning with other human beings (Bannan and Woodward, 2009: 470-471).

Accordingly, I suggest that the dyad's vocal play is a prime example of developmentally appropriate practice[31] and that the notion of musical development according to neatly demarcated stages should therefore be discarded. Instead, I consider development as a system that has to be nurtured from as early an age as possible. Furthermore, I argue that over and above the astonishing innate ability of infants to synchronise the timing of their multi-modal emotional acts during rituals of intention, the intuitive inclination of the dyad in a contingent relationship is to communicate musically, by this means providing a co-constructed framework for early cognitive and social development.

[31] A pedagogical framework that reflects knowledge regarding the processes of development and learning is a developmentally appropriate practice (Jordan-Decarbo and Nelson, 2002: 226).

Therefore, in line with the proposal that early musical development is based on combinations of biological factors as well as processes in the environment, the infant's cognitive functioning will be embedded in the next section in a dyadic systems view of communication 'where the actions of the individuals are jointly defined by both partners' behaviors' (Jaffe et al., 2001).

3.5 The cognitive functioning of the infant: a systems view of communication

> The timing of adult-infant dialogue can be conceptualized as a dyadic coordination of rhythms that are modified in changing environments, and that underlies social relatedness, mother-infant bonding, and cognitive processes (Jaffe et al., 2001: 90).

It is argued that the non-verbal timing of vocal, face and motor gestures, as a two-way communication or duet, provides the basis for social and cognitive developmental outcomes,[32] which in turn support foundational music learning processes.

According to Jaffe et al. (2001: 36 cognitive developmental outcomes of infants should not be understood as the prediction of IQ as is generally conceived. Instead, the ability to 'function' as a co-partner should rather be an appropriate indication of the infant's cognitive status. In this regard, 'functionality' is defined as the infant's inborn, intentional and eager participation in musically appropriate behaviour (for example, to vocalise in response to attention, to act 'in time', to fill a 'gap' during a narrative or to imitate a pitch) and so to demonstrate that 'real life' interactions have resulted in the abstraction of musical representations as discussed before.

In a pragmatic sense, Jaffe et al. trace a pathway in which the mother-infant regulation of emotional behaviour can be understood as a *format* of procedures. They explain that the infant's 'rhythmical' behaviours of approach and avoidance, the showing of 'interest', 'pleasure', 'distress' and 'imitation' during nonverbal conversation, in fact, 'presage' the functioning nature of adult social conversation, namely procedures of 'greeting and partings, asking questions, giving orders, apologizing, pleading and soothing' (Jaffe et al., 2001: 29). In a similar vein, Flohr

[32] The functioning of mental and motor skills, thus the infant's sensitivity to temporal structure, could be regarded as an assessment of foundational cognitive developmental outcomes (Lewkowicz, 2000: 281-308). In turn, the infant's sensitive and appropriate behaviour in a reciprocal relationship describes social developmental outcomes (Jaffe et al., 2001: 138).

and Trevarthen (2008: 70) articulate the social behaviours of communication metaphorically as follows:

> Babies hear human sounds, maybe all sounds, not as pitches, harmonies and so on, how music psychologists categorise sounds of music, but as expressions of the effort, affection, weakness or caution of human moving to make the sounds, and immediately in relation to the motor patterns of their own subjectivity or self-awareness […] Their moving matches that of their affectionately attentive parents and to some extent the music in their environment […] Their life is conducted in body time […] not clock time.

Furthermore, the matching of each other's inner rhythms, or what Jaffe et al. refer to as the 'timing pragmatics' of mother-infant conversation, are to know when to vocalise, when to pause, how long to pause, to sustain attention when appropriate, to be able to take turns, to join with enthusiasm or to interrupt suddenly, to imitate, to hold back or to continue conversation (Jaffe et al., 2001: 29). These intimate processes, which become *predictable* in the course of repetitive experiences, are indicators of the established cognitive and affective functioning of young children that play a part in the conversation of the social environment (Jaffe et al., 2001: 114-116). Therefore, mother-infant vocal play should not be understood as a back and forth shifting of individual achievements, but rather as a common action of intention, 'a joining of purposeful communicative intent' (Gratier and Trevarthen, 2008: 29).

The implication is that a rhythmic relationship emerges in what Bloom calls 'getting into sync'. This is 'a process in which persons act in ways that are responsive to the actions of those with whom they are in communication' (Bloom, 1993, cited in Jaffe et al., 2001: 26). Accordingly, these 'patterns of coordination in an associated self-regulating range and style' form one definition of procedural knowledge of the social environment (Jaffe et al., 2001: 29).

A central point is reached in the recognition of the value of social conversation in the life of the infant. It is in the 'moment-to-moment' repetition of action patterns, with day-by-day variations depending on the infant's changing mood, prediction, anticipation and motivation that developmental outcomes occur. These patterns of interactive behaviour generate anticipation, avoid habituation, maintain the infant's attention, support his/her sense of security and in this way maintain the

developmental needs (Jaffe et al., 2001: 14). Ruth Feldman (2007: 346) has made a similar claim when she argues that:

> interactions are adjusted to micro-shifts in infant affect and arousal, [and] coalesce into patterned configurations of vocal, visual, and affective sequences […] [E]arly experience is critical for the development of symbol use, empathy, emotional resonance, and self-regulation.

3.6 Procedural knowledge as a systems view of cognition

Elliott's praxial philosophical stance, essentially procedural in format, identifies music making as a matter of intentional human activity (Elliott, 1995: 39) and as a gradual and interactive developmental process. His philosophy is therefore relevant to mother-infant non-verbal communication, in so far as 'actions are nonverbal forms of thinking and knowing in and of themselves' (Elliott, 1995: 55). All human action is regulated in rhythmic time (Trevarthen, 2005: 105). Lee (2005, cited in Flohr and Trevarthen, 2008: 67-68), explains the implication of human activity as follows: 'Without movement we [...] would not be able to perceive, since perception is an active process. Consequently we would not be able to think […] In short we would be dead'.

Therefore, it is to be expected that it is in the day-to-day mutual regulation of temporal structure that music learning takes place. Musical meaning is given to the present moment interaction between parent and infant that carries into the future. 'Interpersonal interaction [...] involves past memories, present realities, and expectations of the future [such as the symbolic process of 'thinking' in music namely audiation] based solely on the past' (Stern, 1985/2000: 168). As a result, the jointly created behaviour of expectation emerges as a critical organisational feature of the mother-infant communication. The infant, as well as the mother and father (Addessi, 2009: 747), display the inherent drive to organise information, to create expectancies and to respond to these expectancies according to the following strategic framework:

Firstly, in cognitive development, repeating rhythmic accents makes it possible for both partners to 'guess' how the other will proceed, to coordinate with the other's response and so 'the infant [is provided] with a structure for forming temporal expectancies that organise both social and cognitive experience (Jaffe et al., 2001: 2). Heidi Westerlund's (2003: 47) definition of this type of 'experience' is fitting: 'The

phenomenal side of experience is a process of simultaneous doings and undergoings, which means that there is always a continuum from individual action to social action and context'. For example, Longhi (2003, cited in Juslin and Västfjäll, 2008: 586) has found that the musical tempos of allegro and andante might be of importance during mother-infant conversation, because the infant might use these tempos to anticipate the temporal structure of the musical interaction. She comes to the conclusion that mothers naturally more often sing songs at these tempos, because the actual pace of the songs enables both partners to temporally organise their behaviours and interlock with each other.

Secondly, Mechthild Papoušek (1996: 102) suggests that the natural environment also adds in a major way to the natural rhythmic absorption processes of the infant. Examples are the rhythmic processing and integration of stimuli, such as the absorption of another's regular breathing, in carrying the infant, or sleeping in close body contact, doing routines such as teeth brushing, moving at different speeds and doing physical work rhythmically while holding the infant, and absorbing the structural elements of all sorts of sound patterns in the environment such as clocks, bells and other household items.

Thirdly, the musical qualities of communicative musicality (for example raised pitch contour and temporal structure) help the infant to recognise the self as distinct from the other. 'The consistent appearance gives the musical elements the attributes of familiarity and predictability which are basic elicitors of cognitive operations' (Papoušek and Papoušek, 1981: 205).

It becomes apparent that the joint rhythmic interaction of the dyad is 'programmed' as a generating source of procedural knowledge in that the infant displays an innate drive and agency to move rhythmically with others who are 'comforting, encouraging, watchful, and critical' (Emde, 1992: 34). Also, that the mother delivers an abundance of musical knowledge. Hence, one can assume that a significant amount of procedural learning takes place in the situated environment of the home, not only in the non-verbal acts of the dyad, but also in the everyday presence of the other.

3.7 The structural design of memory systems

It is well documented that infants construct representations in procedural format, based on the mutual expectation of ongoing non-verbal conversation (Stern,

1985/2000, Emde, Biringen, Clyman and Oppenheim, 1991; Ten Berge and Van Hezewijk, 1999; Jaffe et al, 2001; Bannan and Woodward, 2009). In fact, from a neurobiological perspective, procedural knowledge, or the knowledge of how to act, is naturally structured as representations: 'When an input is fed to a network it knows how to react' (Ten Berge and Van Hezewijk, 1999: 615).

In his explanation of the evolutionary pathway of memory systems, Timon ten Berge and Rene van Hezewijk advance the notion that there are two types of memory systems (1999: 615-616). The procedural system is the first in which representations are structured from stimuli that are non-verbal, non-symbolic, and automatic. Declarative memory is the second type. Representations are formed from conscious and verbalised behaviours, but the latter 'builds on' the former: […] 'declarative memory evolved from procedural memory, and is more or less part of it' (Ten Berge and Van Hezewijk, 1999: 616). It should, however, be remembered that 'accumulated knowledge' is not received passively by the mind, but that the mind (of the infant) is an 'active, creating one that interacts [with the object] in such a way that human mental processes act upon the object and create a set of properties' (Serafine, 1984: 220), such as processes of coherence and unity as discussed in Section 2.4.2. So, once the pragmatics of a temporally structured narrative between mother and child are stored through repetitive interactive procedures, specific information is programmed for future use by way of recalling that specific information.

3.8 Procedural knowledge as the vital beginning of preparatory audiation

It is clear that Infants construct representations in procedural format. It is in this way, and from a theoretical music learning perspective, that I propose that the increase of procedural knowledge in the first months of life implicates the vital developmental processes of *preparatory audiation*,[33] a term coined by Gordon. Gordon (2003: 374) explains that *preparatory audiation* is the process of 'hearing and comprehending music while in the "music babble" stage as a readiness for engaging in audiation'; it commences at birth and lasts more or less five to six years (Gordon, 2003: 237).

[33] Preparatory audiation is a sequential process that consists of three types and seven stages. The first two stages of the first type (acculturation) are the primary focus of this study, but for a sense of continuity it should be explained that the next type of preparatory audiation is *imitation* where children learn primarily as a result of the mutual imitation of tonal and rhythmic patterns. Imitation is followed by the *assimilation* type of preparatory audiation in which young children synchronise their own singing and chanting with coordinated movement and breathing (Gordon, 1997: 41; Gordon, 2003: 237).

Accordingly, the vital beginning of audiation is the non-verbal, non-symbolic, unconscious and eager response to and absorption of sounds and sound patterns in the home environment. This is in line with my proposal that cultural processes also play an influential role in the development of musical abilities.

For approximately half a century, Gordon has been teaching, observing and documenting the musical development of infants during the first eighteen months of life (Gordon, 2003: ix-xv). Only a few researchers have analytically documented what comes about when infants perceive musical guidance in natural environments (Valerio et al., 2006: 33). This paucity of literature emphasises the usefulness of Gordon's contributions.

From a music learning perspective, Gordon's research is particularly useful to parents who do not have the confidence (Street et al., 2003: 628), musical background or time (Gordon, 1997: 3; De Beer and Pretorius, 2011; De Vries, 2009: 402) to guide their infant's musical development. In this regard, his research explains 1) how to guide young children through types and stages of preparatory audiation as a preparation for the skill to hear and understand music, 2) how to understand the development of musical aptitude and 3) how to internalise an educational framework, based on Music Learning Theory,[34] in an informal and developmentally appropriate way (Gordon, 1997; Gordon, 2003).

Gordon's motivation for sequencing the stages of preparatory audiation is primarily to explain the infant's musical development as a learning process, as well as to provide a teaching model that makes clear how to proceed with informal interactive activities in order to achieve lifelong involvement and achievement in music making and appreciation (Gordon, 1997: 29). By means of his Music Learning Theory, Gordon aims to empower parents to develop their understanding of the 'how', 'when', 'what' and 'why' of early childhood musical development. In my own experience as an early childhood music teacher, are parents well aware of the fact that participation in musical activities adds to their infant's development. However, advocacies such as increased brain activity, better social skills and better mathematical skills have caused parents' interest in the non-musical outcomes of music education.

[34] Gordon's Music Learning Theory (1997; 2003) is an explanation of how children can learn by usage of appropriate learning sequence activities. Learning sequence activities are the practical application of learning theory and based on the audiation of tonal and rhythmic patterns (Gordon 1997: 25).

Etopio and Cissoko point out that advertisements that promote music for young children seem to concentrate more on the 'non-musical benefits of music in early childhood' and not on music for music's sake (2005: 53). Franchise music programmes, being the most popular musical exposure many young children receive, apply this advertising strategy with great enthusiasm and in so doing motivate participation not for the best reasons. Moreover, only a few of these franchise programmes are based on a solid theory, or recognise the importance, or even existence, of audiation (Etopio and Cissoko, 2005: 54). Therefore, parents should be appropriately informed *vis-à-vis* musical guidance and development. In this way, they can develop the confidence to take responsibility for their children's musical development at home at an age that it is crucial for the development of the skill to hear and understand music in the mind.

3.9 Preparatory audiation as a systems-based approach

Although preparatory audiation may seem at first glance to be yet another stage model, it is indeed an excellent example of a process of music learning embedded in a systems-based developmental approach. In order to establish my viewpoint that Gordon's Music Learning Theory answers to a systems-based approach, I identify the social context and the learning process in which Gordon situates the concept of preparatory audiation. Gordon (1997: 3) asserts that 'the home is the most important school young children will ever know, and parents are the most important teachers they will ever have' and '[t]he most important time for [music] learning, however, is from birth (if not before) until eighteen months, a period during which a child learns through exploration and from unstructured guidance by parents' (Gordon, 1997: 1). Gordon stresses that '[a] child's music aptitude is innate, but it is affected by the quality of the child's environment' (Gordon, 1997: 3). Furthermore, Gordon advocates for a flexible approach in the musical instruction of the individual child in stressing that music learning should address the process and not the product of learning:

> The individual child should have emerged from tonal babble and rhythm babble and have passed through most, preferably all, of the types and stages of preparatory audiation before they begin to take instrumental lessons, because unless children can sing in tune and move their bodies with good rhythm, they will not be able to learn to play an instrument in tune or with good rhythm (Gordon, 1997: 103).

3.10 The stages of acculturation

The vital beginning of preparatory audiation, referred to in Section 3.8 and 3.9, constitutes the first stage of the first type of preparatory audiation, the acculturation type. The acculturation type consists of three hierarchical stages: absorption as the vital beginning, the stage of random response and the third stage of purposeful response.

Gordon (1997: 20, 40) makes clear that it is during the first stage of acculturation (absorption) that the young infant perceives and aurally collects environmental sounds. Examples of environmental sounds are people talking, singing and making other sounds in the house and in the street, sounds on the radio and television, and in the supermarket or church. Most often, this process lasts eighteen months (Gordon, 1997: 44). It is during this stage that infants make babble efforts and in so doing develop subjective tonal and rhythm syntaxes (Gordon, 1997: 236). Therefore, this stage of absorption, which is the most important in the earliest months of life (Gordon, 1997: 44), could be identified as the roots of *enculturation*, which is, according to Patricia Shehan Campbell (2002: 65), 'a natural, holistic, lifelong process that begins in childhood'.

Gordon suggests, however, that overlapping between stage one and stage two can take place in that the second stage, in which the infant responds *randomly* with 'associated moving and babbling efforts', could occur almost concurrently with the first stage (Gordon, 1997: 44-45). For that reason, in recommending guidelines to parents in order to develop their (non-verbal) infants' audiation skill, I will reflect on the absorption of musical sounds, as well as appropriate techniques in order to embody musical experiences in the first year of life.

During the third stage of acculturation, probably starting at eighteen months, young children begin to make 'purposeful responses in relation to their environment' (Gordon, 1997: 51). However, most important is that infants base music babble sounds and movements in all subsequent stages on the musical sounds that they have become acculturated to during the first absorption stage (Gordon, 1997: 51). In this regard, I propose that Gordon's theory of music learning corresponds with the Swanwick and Tillman spiral theory of musical development (Swanwick, 1994: 86-87). In both theories developmental stages are not only spiralling upwards, but previous stages are also revisited. In addition, a rich listening environment which

sustains the aural[35] function of absorption in turn upholds the oral product of singing and chanting and later on the skill of reading and writing music:

> [Speaking, reading and writing] are all developed within the context of the types and stages of preparatory audiation, which has to do with building an extensive listening vocabulary and initiating a speaking vocabulary (Etopio and Cissoko, 2005: 53-54).

Gordon recommends that parents provide listening opportunities with associated moving for all three stages of acculturation, as well as for the two stages of imitation and the two stages of assimilation. The recommendation is only that it should be with increasing complexity such as the layering of more tonalities and metres, as well as the absorption, association, participation, communication, discrimination and inference of melodic and rhythmic patterns, within a variety of familiar and unfamiliar musical contexts (Gordon, 1997: 52-59; 2003: 123,160). It is therefore appropriate to give a condensed overview of the continuation of the pathway pertaining to the audiation of patterns.

Rather than following other theoretical approaches that extract tonal and rhythmic information from only a few songs, primarily for the reason of starting as early as possible with the reading and writing of music, Gordon claims that the ability to give syntax to music commences very early (already in the third stage of acculturation) with the participation in (not teaching of) the singing and chanting of melodic and rhythmic patterns, 'out of context' (thus not extrapolated from only a few 'known' songs) and in as many tonalities and metres as possible (Gordon, 1997: 52). In other words, Gordon argues that syntax is given to a specific tonality and specific metre by way of hearing and performing sequences of patterns.The patterns

> facilitate perception and change in mental structures within the context of music [...] As the musical vocabulary becomes engrained in the learner, perceptual abilities grow, vocabulary becomes richer, ability to audiate becomes refined and musical perception and learning is consequently enhanced (Taetle and Cutieta, 2002: 287).

[35] According to Gordon's proposed curriculum of music learning, the aural/oral is the most basic skill upon which two generic types of music learning, discrimination and inference (conceptual learning) are built (Gordon 2003: 376). At the verbal association level, for example, reinforcement takes place by using tonal and rhythm syllables and at the partial synthesis level students learn to discriminate between series of tonal and rhythm patterns, not just between individual patterns (Gordon, 2003: 95, 107). At the exit level, namely theoretical understanding, 'the attempt is to explain to students through intellectual understanding why we perceive, sensate, and audiate as we do when we engage in musical thought and performance' (Gordon, 2003: 132).

In order to understand the stage of absorption as the groundwork of the audiation process, the skill of *audiation through listening*[36] will be sequenced as follows:

1) Absorption and momentary retention of musical sound take place.
2) The audiation of melodic patterns (with a tonal centre) and rhythmic patterns (with a temporal structure consisting of beats) is established.
3) Subjective syntax or objective syntax of different tonalities (of tonal patterns) and different metres (of rhythm patterns) is gradually audiated.
4) The tonal patterns and rhythm patterns that have already been categorised through repetitive exposure are consciously held in audiation.
5) Comparisons of familiar tonal patterns and rhythm patterns and inference to unfamiliar music are made through the process of recall.
6) Conscious predictions are made about tonal patterns and rhythm that will come next, in familiar and unfamiliar music (Gordon, 1997: 20).

The purpose of this discussion is to shed light on the earliest pathway of acculturation during the non-verbal phase of musical communication, before the onset of words – more or less for the duration of the first year of life. Therefore, it is the first stage, and the developmental characteristics of the overlapping second stage, during which the children base their babbling efforts and random movements on musical sounds in the environment (Gordon, 1997: 33) that primarily concern this study.

3.11 The preparatory stage of absorption

Absorption optimally occurs when the young infant listens, and has the opportunity to move to diverse music on a daily basis. Gordon maintains that the absorption stage of acculturation is fundamental to audiation skills and therefore to the development of musical creativity (Gordon, 2003: 236). Although absorption is an ongoing process, it takes place preferably during the first twelve months (Gordon, 1997: 34, 44). In other words, Gordon claims that the infant is capable of giving subjective syntax (or meaning) to pitches and durations by comparing the context of different tonalities and metres that underlie patterns of absorbed musical sound patterns already in the first year of life:

[36] Listening to music is one of eight types of audiation, The others, although not hierarchical, are audiation in reading, in writing, in recalling and performing, in recalling and writing, in creating and improvising during writing, and creating and improvising during reading (Gordon, 2003: 14-32).

> From birth to eighteen months, when children are in initial stage of music babble, they develop subjective language and subjective tonal and rhythm syntaxes. During that time, they sing what they are hearing as they are hearing it. When they are older, they begin to conceptualise […] [H]ow they behave before three is fundamental to their later achievement, because the basis of creativity and improvisation is embedded in their early subjective thinking and subjective audiation (Gordon, 2003: 236).

Accordingly, Gordon is challenging the general contention that children at a young age internalise only basic structures, such as major and minor tonality and duple and triple metre:

> When they listen to an abundance of music in the same tonality they grow accustomed to the familiarity of expected sounds that will inhibit their learning in other less familiar tonalities and meter later when they engage in higher types and stages of preparatory audiation, and in audiation itself (Gordon, 1997: 41).

Findings in the field of psychology convincingly correspond with Gordon's position on not only the importance of, but also the surprisingly early capacity of the infant to absorb a variety of musical contexts (although they are more precise in perceiving diatonic melodies such as Major and Minor (Trehub, 2003: 669). Trehub found that, in comparison with adults, eight month old infants achieve better in perceiving a diatonic change in a short, modified ten-note melody, according to Western tonal music, and accordingly proposes that '[i]t is likely that adults' perception of melodies is influenced by schemata, or perceptual-cognitive structures, specific to Western tonal structure' (Trainor and Trehub, 1992: 400).

An early universal phenomenon regarding the syntactical organisation of musical structures is also that infants prefer consonances over dissonances (Trainor and Heinmiller, 1998: 77) and show sensitivity for metrical interpretation based on past experiences of associated movement. These basic attributes afford the processing of 'complex, culturally unique musical systems' (Hannon and Trainor, 2007: 468-470) as well as enculturation processes of the own culture. Thus, music acquisition progresses from universal to culture specific processes.

More recently, in an intriguing study done by Hannon and Trehub, even more weight is put on the notion of early acquisition of perceptual knowledge. The research bears out that infants, after a short period of exposure, are able to perceive changes within

non-symmetrical Balkan metres of 7/8, and in comparison even better than adults. In other words, in the light of recent research, the young infant demonstrates remarkable inborn universal musical cognitive abilities to perceive and communicate in various musical contexts.

> A lifetime of exposure to Western music may entail greater perceptual "commitment" to Western metrical structures; […] [however] a limited amount of passive exposure could eliminate these biases in infants but not in adults (Hannon and Trehub, 2005: 12643).

Simply stated, adults' learning of 'other' musical contexts slows down in comparison with the infants' vigilant perceptual abilities, which are clearly more inclined to modification.

3.12 The audiation of a rich variety of music as the basis of the development of music aptitude

The audiation of a rich variety of music is exactly what Gordon means by the development of musical aptitude, which should not be confused with audiation in that '[a]udiation is the basis of music aptitude. The extent to which one intuitively audiates essential pitches and durations in music and organizes them subjectively or objectively is a measure of one's music aptitude' (Gordon, 1997: 19). Gordon states that all children have the innate potential or 'musical aptitude' to learn music. Incidentally, approximately 68% of humans are born with average potential, 16% have low potential and more or less 16% have high potential of whom 2% have very high potential. However, the quality of a child's aptitude is affected by the quality of the musical environment (Gordon, 1997: 9). The quality of the early musical environment is already shown to be determined by the 1) intuitive mother-infant duet as well the 2) everyday absorption of a variety of musical contexts. Gordon states that it is more important that a child's musical environment is of high quality at the early age of six months than at eighteen months and a child's musical aptitude decreases after birth if the musical environment is not appropriate for the absorption of sound.

In other words, Gordon claims that the inborn musical aptitude can only decrease and not increase, depending on the musical environment cultivated at home. At the age of ten the child's developmental music aptitude that concerns tonal and rhythmic

discrimination of same and different patterns is ‘stabilised’ (Gordon, 1997: 10) and is therefore a determining factor for the skill to audiate these features in music. Thus musical aptitude is determined by issues of nature as well as nurture.

It may be assumed that a child with high musical achievement has high musical aptitude. It may not be assumed, however, that a child with low achievement, one who does not sing, for example, has low aptitude. ‘Many children […] have not received structured and unstructured informal guidance in music and so have not been given the opportunity to learn music to the extent that their music aptitudes will allow (Gordon, 1997: 16). From a neuroscientific perspective, Braun and Bock (2008: 28-29) state: “[E]ven though the genetic predisposition (the quality and spectrum of the keyboard) is excellent, the capacity of the brain might not develop optimally if environmental stimulation is not adequate”.

3.13 The implication of a chain reaction within a systems approach

Susan Young reports that parents ‘are relying heavily on baby and toddler groups to learn the song and rhyme repertoire they used at home’ in the ‘absence of songs belonging to family or cultural heritage’ (Young, 2008: 39). For that reason, it is imperative to reflect on the possible effect of the transmission of musical knowledge. Over the time span of twenty years, I have come in contact with a wide variety of musical practices. As a music education specialist of a popular childhood music programme, in contact with hundreds of parents of young children in a music school, in visiting pre-primary schools in rural areas as well as in the city, as a lecturer of early music education at a tertiary institution, and as a user and researcher of teaching material and curricula current in South Africa, I have invariably found the following: informal and formal early childhood and foundation phase musical practices make use of well-known songs and listening material in major tonality, very little in harmonic minor tonality and often make use of two-tone songs, three tone songs[37] and pentatonic songs, which are ‘drilled’ throughout the year, in particular if an Orff instrumentarium is available for a Christmas concert. Moreover, often the listening repertoire is focused on the conceptualisation of musical elements/concepts and as such restricted to extracts from *Peter and the Wolf* (Prokofiev), *Carnival of the Animals* (Saint-Saëns) and *Flight of the Bumblebee* (Rimsky-Korsakov) – listening for audiation purposes is not a focus.

[37] Two-tone songs are soh-me songs and three-tone songs are soh-me-lah songs.

Children's folksongs are frequently pentatonic and are based on the natural ability to sing the interval of the descending minor. Furthermore, a well-known music educator such as Carl Orff advised the use of the pentatonic scale for young children's improvisations, because it is a practical technique. So, young children never play 'out of tune' in the 'selection' of notes for an ostinato in early ensemble work. The renowned Zoltán Kodály also does not recommend the singing of semitones in the early stages of development.

In the light of Gordon's argument that the resting tone is essential for audiating the syntax of a given tonality (Gordon, 2003: 11), it is necessary to discuss the frequent use of pentatonic songs in early childhood education. However, it is not my intention to overlook the value of any theories or approaches, other than that of Gordon, in this discussion.

Gordon criticises the frequent use of a pentatonic scale for the following reasons:

- It does not have the essential features of half steps or a leading tone and tonality and can therefore not be audiated;
- There is no sense of tonality because any of the five notes in a pentatonic scale could function as a 'pulling' towards, and not 'understanding' of, the resting tone;
- Operating as a fundamental experience, it will have a negative effect on the audiation of major and minor tonalities later on (Gordon, 1997: 64; 2003: 157-158).

3.14 Informal, unstructured guidance

It is evident that parents should be informed that informal guidance provided in the innermost circle, the micro system, based on a solid theory of music learning (in order to audiate), is an excellent pathway towards audiation.

3.14.1 Guidelines for listening to music in order to absorb musical sound

Gordon is convinced that if parents 'can sing with relatively good intonation and can move their bodies with flexible and free flowing movement and enjoy doing so, even though they do not play a musical instrument, meet the basic requirements for guiding and instructing their children in music' (1997: 3). However, I am equally convinced that parents, especially in developing countries, should pro-actively be

assisted in order to develop the appropriate skills, knowledge and values pertaining to active music making in the family context. In tracing this pathway, I have identified three informal strategies from the writings of Gordon in order to establish a necessary foundation for the skill to audiate.

Infants should listen on a daily basis, during the first eighteen months of life, and even during sleep in 'barely audible' tone (Gordon, 1997: 43), to music of diverse tonalities/keys, harmonies, metres, timbres and tempos (Gordon 1997: 41; 2003: 11). The following is a selection of practical criteria, based on Gordon's theory for music learning, to empower parents to embark on the musical parenting of their newborn:

- Infants cannot listen to music too often, and the sooner they engage, the better;
- Instrumental music in all styles and genres offers the best learning material, but music performed by large ensembles is better than small ensembles;
- Recordings intended for children are not suggested, particularly those that include a storytelling text; parents should rather make use of music that they themselves enjoy, find aesthetically pleasing and exciting;
- Contrast in musical content captivates and redirects the infant's attention. For that reason the texture of music should be of a wide variety; dynamics should change frequently; abrupt changes in tempo are preferable – however, timbre should always be pleasant;
- The temporal structure should be well articulated, but long and exaggerated *ritardandos* and *accelerandos* interrupt rhythmic flow (Gordon, 1997: 40-44).

3.14.2 Guidelines for performing songs and chants

- Short songs, 'without words'[38] and with repetition, as well as rhythmic chants, should be sung and chanted respectively ('live') to the infant. It should be done expressively, with good intonation and with the usage of a neutral syllable e.g. 'bam' for songs and 'bah' for chants (Gordon, 1997: 43).
- Also, Gordon explains that, so as to support the infant's audiation skills through the mental act of recognition, a specific song or chant should be performed each time 1) in the same tonality, key and tempo, 2) with the *tessitura* range between D (a major second above middle C) and A (a mojor

[38] Gordon writes that if the infant listens to music with words the text distracts attention from the musical features needed for musical absorption and so slows down acculturation (Gordon, 1997: 41).

sixth above middle C), 3) with free flowing movement and 4) without any instrumental accompaniment (Gordon, 1997: 40-51).

- Gordon asserts that musical variety during the absorption stage of acculturation is the most important feature. He argues that in order to develop the fundamental skill to discriminate between same and different, songs and chants in as many tonalities and metres respectively should be sung and chanted to infants – for example, songs in major, harmonic minor, mixolydian and dorian tonalities and rhythmic chants in duple and triple metres (Gordon, 1997: 41).
- Singing and chanting to infants should always be an enjoyable experience. It should be without any expectations for immediate results in terms of musical achievement, because 'it is in the fun and enjoyment that spontaneous responses occur' (Berger and Cooper, 2003: 163).

3.14.3 Guidelines for associated movement

> Both the environment and the behaviour of the infant possess a temporal organization. The ability to process time-related information and the ability to structure his or her own action within that time (that is, the capacity to act at the 'right time') are […] essential to the development of the infant's motor skills, perceptual and cognitive abilities […] and […] of his or her affective behavior (Pouthas, 1996: 115).

Furthermore, Gordon strongly disagrees with the widely used practice of manipulating the child's body parts, for example, clapping in order to teach rhythm. Gordon asserts: '[n]either the adult or child should clap hands, because accuracy in clapping requires coordination and the proper use of weight' (Gordon, 1997: 68), which the young child is not capable of and which anyhow hinders a good sense of rhythm – 'good rhythm requires coordination, freedom, flow, weight, relaxation, and balance' (Gordon, 2003: 176). Thus, while standing in place, parents may move in a smooth, flexible, free flowing and continuous manner with the upper body and particularly the hips (Gordon, 1997: 51). In so doing, they will make use of the elements of flow, space, weight and time which is a prerequisite for the skill of how to audiate rhythm (Gordon, 2003: 176). For example, *space* may be translated as large, 'swimlike' spacious movements and different levels of high, middle and low and different pathways in the air such as straight or curved, *time* as tempo changes sustained or quick, *weight* as heavy and light movement and *flow* as free or bound (Valerio et al., 1998: 18-20). In an integrated approach, parents might later on

improvise stories and games (Gordon, 1997: 76) as an image for free flowing movement, for example, the image of a balloon that is blown up, rises in the air and is blown around by the wind.

3.15 Music practices: appropriate and inappropriate

It is clear that the pathway of musical communication, in the early years of acculturation, points in a clear direction: that development of audiation skills is not only rooted in, but also grows and flourishes by way of mother-infant vocal play and appropriate guidance in the inner circle of the home environment.

This has implications for music teaching and learning in group music making practices such as franchise programmes and other early music childhood settings. It is unlikely that developmentally appropriate outcomes as described throughout this study, such as the spontaneous 'attunement' or synchronising of feeling states, the exchanging of speech rhythm contours, the automatic adjusting of bodily gestures, the imitation of melodic contour, the creating of elaborate variations of vocalisations, and also the daily exposure to a variety of musics, could be achieved in an environment of instruction.[39] In short, it is not possible to provide interactive musical communication, on a fairly regular basis as implied by Bronfenbrenner's systems theory, to twelve (such as in many music specialist programmes) and even thirty (in day-care and other informal settings) infants. Nor is it possible to support the discovery of each child's singing voice phase by modelling to each child individually, which is a prerequisite for the skill to audiate (Gordon, 2006: 13).

Moreover, Margaret Barrett indicates that informal music practices in early childhood settings tend to implement all sorts of musical activities, such as finger plays, counting songs and structured movement, in order to enhance the utilitarian values of music, such as physical development, social development, and general conceptualisation skills. However, 'little music generation for viewing music as a creative rather than a re-creative practice, exists' (Barrett, 2006: 218).

Furthermore, in reflecting on developmentally appropriate practices, Aletta Koch-Lochner (2007: 1) observes radical inconsistencies regarding the process of

[39] In musical instruction it is expected from the participants (child or mother and child) to co-operate and respond to specifically planned activities, in allotted time periods and done by a facilitator (Gordon, 1997: 1, 2, 4-8). In this sense it is not spontaneous.

enculturation,[40] as well as the lack of professional knowledge and skills in the facilitation of franchise programmes that are offered from birth to approximately seven years of age:

> Currently music stimulation programmes such as *Kindermusik* and PRACTICA are being presented all over South Africa. Most of these programmes comprise foreign models based on foreign music material. These programmes can be purchased as franchise by any interested person [without sufficient musical background] (Koch-Lochner, 2007: 1).

From a cultural and therefore also educational point of view, such practical applications are perplexing, bearing in mind that the style, rhythmic patterns and melodic contours of music '[are] clearly a cultural achievement of human society' (Trevarthen, 2002: 21). Bennett Reimer (2003: 168) argues that although musical experience includes contextual, universal as well as individual levels, the cultural context is a major factor in that the experience 'stems from the particularities of our social condition – the ways we are […] in an inhabited social space pervading every aspect of our lives' (Reimer, 2003: 171). Music education's function is to make experiences of musical meaning 'more deeply and widely accessible, thereby contributing […] to each culture's and each individual's identity' (Reimer, 2003: 173).

In this context, a sense of individual and social identity is embedded in a social group with 'known habits, celebratory experiences and acting skills that is valued for the bonds that they represent and reinforce' (Trevarthen, 2002: 22). In other words, a sense of cultural belonging is expressed through an interpersonal relationship, particularly in the life of infants and young children (Stern, 1985/2000). Trevarthen (2002: 22) puts this succinctly: 'When a six-month old smiles with recognition of a favourite song, and bounces with the beat, it is like knowing his or her name displaying a "me" within the family's affectionate pleasure of sharing'.

It can thus be deduced that the usage of unfamiliar music in music programmes (in this sense understood as the universal experience of music) could either benefit audiation processes, or disturb a sense of cultural belonging, depending on the balance of familiar and unfamiliar cultural activities. In both music educational

[40] Hannon and Trainor (2007: 466) describe musical enculturation as the process in which 'everyday exposure to a particular music system creates, in a systematic order of acquisition, culture-specific brain structures and representations'.

settings as well as the home environment, however, inappropriate practices are also to be found.

In the case of the home environment, it is often the result of a lack of knowledge, motivation or time that affects the young child's potential to develop audiation skills. In this regard, in an empirical South African study conducted in Bloemfontein, Welkom and Kemptonpark, it was found that 'parents do not have the insight when and how to nurture their infants musically, nor did they demonstrate the musical knowledge or conceptualising skills to guide their young children (De Beer and Pretorius, 2011: 39). Moreover, none of the following situations promises good music developmental outcomes:

- parents employ musical toys with digitized components to entertain and stimulate their children, although these are 'often musically impoverished, with limitations of pitch range, rhythmic interest, timbral variety and harmony. Moreover, when melodies are included, they are culturally very narrow' (Young, 2008: 40);
- parents tend to transfer the responsibility for their young children's musical communication at a too late stage to a music specialist or preschool for a 'complete musical experience' (De Vries, 2009: 402; De Beer and Pretorius, 2011: 39);
- parents make use of a variety of commercially manufactured videos, DVDs and CDs which children can engage in 'without an adult present' (De Vries, 2009: 403) and the non-interactive nature of these media does not support audiation;
- there is a decline in mothers' and fathers' motivation to sing and dance with their infants (Papoušek, 1996b: 89);
- there is an absence of songs to be used within a family context (Young, 2008: 39);
- there is a lack of knowledge on what appropriate music for babies is (Ilari, 2005: 647);
- there is a lack of confidence as singers in home settings (Street et al., 2003: 628);
- there is a general misconception regarding the nature of musical aptitude (Gordon, 1997: 8-17) and there is a misconception on the parents' part that

> early musical development can take place only in structured educational settings.[41]

Hence, I suggest that there is a gap in parents' knowledge regarding the developmental appropriateness of musical activities. Donna Fox (2000: 25-26) fervently believes that

> [p]arents should be considered a target group for music learning – both regarding music for their children and music for themselves. Parents should learn about the connections between music and language development, particularly the facilitation of conversation and speech.

I thus argue that structured early childhood programmes could not and should not replace the personal involvement of the parent. Furthermore, in my experience the franchise-type music programme is not affordable for the vast majority of South African households. Similarly, Helga Gudmundsdottir and Dora Gudmundsdottir (2010: 300) observe that 'commercial models [are] targeted towards parents with above average leisure time and disposable income'. This statement is all the more applicable to South Africa as a developing country in which socio-economic realities have an adverse effect on the holistic development of infants. Sally Grantham-McGregor et al. (2007: 60) remark that:

> Many children younger than 5 years in developing countries are exposed to multiple risks, including poverty, malnutrition, poor health, and unstimulating home environments, which detrimentally affect their cognitive, motor, and social-emotional development.

Parents should be informed by way of appropriate research that there is an alternative pathway situated in the home environment. The home is not only a natural setting for early music acculturation, but also crucially important as a foundation for the cognitive music acculturation processes of the infant. In my experience as a longtime music specialist in South Africa, who has the opportunity to research the processes of audiation, this issue is seldom recognised.

[41] This assumption was demonstrated recently in a concern voiced to me by a neurologist, who grew up in a 'musical' family, is a father of two young children and himself a gifted cello player who provides a musical environment at home. His concern was that his children would have an irremediable, lifelong handicap for music making because their parents (both professionals) were unable, because of lack of available time, to escort them to a well-marketed music programme.

3.16 A recommended framework for structured musical guidance

Following, I suggest a few basic principles from which a theoretical framework for musical parental guidance (MPG) could draw inspiration. For reasons already stated, the general objectives of this proposal are 1) to inform parents on contemporary knowledge regarding musical development, 2) to make the information free of charge or at least affordable to parents, 3) to develop the infant's audiation skills in a developmentally appropriate way, including both natural as well as guided processes, 4) to address the contextual, universal and individual dimensions of music education, 5) to allow for working parents to participate, 6) to invest in parents' confidence and 7) to contribute to general developmental outcomes.

In reporting on the 'perceived benefits' and subjective mental wellbeing of mothers involved in community-based music courses, Gudmundsdottir and Gudmundsdottir (2010: 300-301) give a useful overview where various types of non-commercial courses are located elsewhere in the world and could therefore be regarded as possible settings for my proposed framework. Musical parental courses are to be found:

- in subsidised art and music schools;
- in conjunction with higher education specialists;
- in community based social equality programmes;
- in church communities.

This argument is especially pertinent to the South African context. Mark Tomlinson and Mireille Landman argue that 'community-based interventions […] contribute to the increasing sense of how aspects of the early relationship between infants and their caretakers are crucial to any complete understanding of infant growth and development', and conclude that 'interventions in the developing world that capitalise on locally available resources are a particular priority' (Tomlinson and Landman, 2007: 292).

In this study, it is argued that cognitive and affective development are promising outcomes of mother-infant rhythmic coupling. Therefore, I propose that a non-commercial course in musical parental strategies should be tailored according to the following didactical principles:

The first principle of the framework is to appreciate, support and encourage the mother's intuitive use of musical behaviour as well as the infant's musical response. In this way the mother-infant duet would be recognised as the first musical xperience, as indicated by Papoušek (1996b: 108):

> For the infancy period it may be advisable not to disturb the earliest form of intuitive musical stimulation by rationally guided artificial stimulation and formal educational intervention, but to keep them concealed as a precious part of early parent relationships.

A second principle of the course is to empower parents to embark on cultural-musical activities that would enhance the musical aptitude of infants. Infants require unstructured informal guidance in order to give meaning to the expressive resources of their own culture, because 'for the great majority of newborns, the level of music aptitude that most children are born with can be expected to decrease shortly, probably immediately, after a child's birth, and will continue to decrease until the child's music environment is improved' (Gordon, 1997: 10).

In order to develop skill in musical parenting, I advocate the use of Gordon's principles and guidelines based on Music Learning Theory, as demarcated in Section 3.14. However, in reflecting on the pragmatic issues of the teaching and learning situation, I am inspired by and draw from the conceptual organisation of a uniquely creative musical performance of mothers and infants, a project named *Bebé, Babá*. This artistic creation was made and afterwards described by Helena Maria Rodrigues, Paulo Rodriques and Jorge Salgado Correia (Rodrigues, Rodrigues and Correia, 2009).

The project, which reflects on the natural as well as learned musical communication between parents and infants, aims to bring together education and performance in the preparation of a 'chain of shows'. This way a 'lap for musical culture' was created and eventually observed by the public. In order to 'prepare' the performance, two types of workshops were run over the course of one month, for parents with babies as well as for parents only, in total occupying approximately twenty hours. During these workshops, sequences of songs, chants and elementary tonal and rhythmic patterns, based on Gordon's learning theory, were audiated by the parents and accompanied by appropriate movement. Additionally, the mothers learned traditional songs, nursery rhymes and creative singing games. Props and material (such as

scarves) were provided as well as a variety of short musical fragments for the absorption of sound, following Gordon's guidelines (Rodrigues, Rodrigues and Correia, 2009: 585-589). Discussions about the basics of early musical development were held. In addition, a strong holistic feature of the workshops was the sharing of private 'vocal play' that parents normally use in their environmental context as well as the sharing of 'private sound games' from home.

I regard this artistic process as a workable approach for a theoretical framework for musical parental guidance. However, I exclude the workshop with infants as well as the performance itself, because the aim of the course is to assist parents to become 'parent-teachers of their culture' (Timmer, 2008: 860). Furthermore, instead of musical toys, I propose the use of environmental sound sources ('found instruments') and self-made instruments in order to stimulate creativity, to conceptualise sound elements, and to keep the cost low. Teaching and learning techniques such as the recordings of specific songs and chants learned in the workshops could enhance learning at home.

In addressing the practical concern that parents experience a lack of time to engage in music activities on a daily basis, I draw on Addessi's (2009: 764-765) theorisation that musical activities could be embedded in daily routines, for example diaper time, free play and bedtime.

In conclusion, current scholarship on the musical nurturing of infants indicates that the community should be informed as to the pedagogical knowledge and value of 1) intuitive musical communication and 2) musical guidance in an interpersonal relationship at home, based on a theory for learning. The integrated format could be facilitated to parents in an approach that is affordable and accessible.

CHAPTER 4: Conclusion

> Musicality seen in the behaviour of infants is a foundation for a growing intelligence. It is the output of an energy plan in prospective control of acting, that gives perception of movement its aesthetic and moral feelings, that relates apprehended reality to the memory of subjective needs and that forms communities of experience in activity (Trevarthen, 2008: 37).

This study has confirmed that the infant could be seen as music-competent, an agent who demonstrates an intrinsic motivation and inborn drive to learn from interactive procedures. Likewise, the mother is portrayed as motivated and naturally skilled in performing the task of the infant's first music teacher. The implication is that the authentic context of the home environment is the infant's first 'music school', and the emotional non-verbal conversation of the dyad the roots of musical knowledge.

In conceptualising the infant's musical ability, I have discussed the newborn's inborn musical abilities before and after birth, which also include the propensity to exchange multi-modal gestures by way of the intuitive and universal phenomenon of infant-directed speech. Infant-directed speech is analysed as a meticulously timed musical duet, described as a non-verbal format of conversation, and defined as a natural process of early music acculturation and for that reason vital for ongoing processes of audiation. The infant is well prepared and motivated for the task of musical communication, displaying a biologically programmed, intrinsic motor force, an inborn sense for pulse and early mimetic abilities when responding to the vocal, emotional and bodily gestures of an affectionate partner.

The innate abilities enable the infant to respond with exceptionally adapted coordination to the didactical nurturing and emotional regulation of the mother in experiences of primary intersubjectivity (Stern, 1985/2000). This position of dyadic coordination implies that the social and emotional relations of the infant, biological predispositions and cultural undertakings all play a role in development.

Accordingly, the psychological developmental of the infant changes as a result of interactive experiences. The infant presents a sense of an *emerging* self (which is afforded by the amodal perception of intersensory experiences), a sense of a *core self versus* other (by way of the integration of experiences of agency, coherence and memory) and a sense of *core self with other* (in resonating with the other as a result

of mutual feeling states of vitality). The infant would not experience these consistent learning events without the company, intention and multi-modal attention of a partner. A central argument is therefore that the infant's first learning and emotional experiences are embedded in a dyadic systems view of communication, in experiences that are mutually regulated, are consistent and become predictable by way of frequent use, an event of which mother-infant vocal play is a perfect example.

In a continuation of the pathway of psychological development, a secondary intersubjective state of affect 'attunement' emerges in the infant's altered and more mature behaviour, in particular of sharing attention and intention as well as the dyad's 'attuning' to the multi-modal gestures of the other, in this way establishing a companionship (Stern, 1985/2000). To this experience, the expressive function of musical features is fundamental. In sharing mental states with another by way of 'attuning', both partners make use of the expressive musical features of time, form and intensity, by this way tying an emotional bond.

Furthermore the reciprocal conversation consists of typical features of musical structure, such as regularity of pulse and melodic contour, which together constitute a musical narrative of intersubjective time. In this way, it is proposed that the pathway model of music acculturation is rooted in the non-verbal, mother-infant lived narrative, in the innate ability to communicate musically. In this sense my proposal is related to Bruner's (1983) iconic declaration that just as young children learn to talk by the informal use of it, infants learn music by the informal use of it. In an elaboration of this argument, it becomes evident that mother-infant vocal play is in actual fact a simulation of the creative developmental strategies of art making. In these endeavours, the infant's vital role is sustained by a remarkable inborn ability for early imitative behaviour, and regulation of temporal structure.

Once the pragmatics of a personalised temporally structured narrative between mother and child are stored through repetitive interactive procedures, specific information is programmed for future use by way of recalling. Thus, it becomes clear that the developmental outcomes of cognition and attachment occur as a result of the dyad's 'moment-to-moment' organisation of mutuality and amodal regulation of expressive behaviour. In this way, it is confirmed that procedural learning, a first form of cognition, is processed as a consequence of the social-emotional related activities of the dyad.

This stance is confirmed from a neurobiological perspective. It is argued that cognitive and emotional competence is acquired by way of early and frequent interactive experiences. The study bears out that early and 'experience driven' musical stimuli, accompanied by positive feelings of emotion, are perceived and transformed as mental representations (conceptualisations) by way of the reorganisation of neural networks. The conclusion is reached that the early absorption of a variety of musical contexts, fundamental to music acculturation, is delayed in the case of adults, in comparison with infants' perceptual abilities which are more inclined to the learning of new contexts.

These scientific findings substantiate the pedagogical claim of Edwin Gordon that musical acculturation optimally takes place in the daily absorption and active response to music of diverse tonalities, harmonies, metres, timbres and tempos (Gordon, 2003: 11), in the natural environment of the home. According to Gordon's principles of music learning, the infant becomes acculturated to different musical contexts by way of the construction of neurological pathways at an age when it matters. This process can be maintained by way of unstructured musical guidance at home, a task for which the parent needs specific information and guidance.

In describing the pathway model of musical acculturation, I have implemented Bronfenbrenner's bioecological model of development. This model represents a systems approach that advocates frequent, appropriate, practical and interactive processes of learning and development, over an extended period of time, thus disputing development as mere biological 'stages' of growth, as in Piaget's earlier conception. I identify the bioecological approach as a convergence of intrinsic biological processes, cultural influences, as well as the dynamics of emotionally supportive attachment relationships. This synergistic position brings to the fore developmentally appropriate models of early childhood music education on the one hand, and problems parents experience in the natural musical guidance of their children on the other hand.

In my research and reflection on an authentic pathway of music acculturation, I have come to the conclusion that even though processes of music acculturation are a summation of many interwoven experiences, the process in fact implies a fairly simple, affordable and adjustable strategy for implementation. Accordingly, I recommend that parents could be informed by way of non-commercial courses on

the appropriate musical nurturing of infants. The first over-arching objective of the recommendation is to empower parents to recognise the value and meaning of intuitive musical practice and by implication the fact that cognitive development is inseparable from social adjustment. Secondly, parents could be informed of didactical strategies for the unstructured guidance of appropriate musical activities in the home environment, based on a theory for music learning and development.

In conclusion, the musical art of the dyad's conversation is portrayed as a narrative of emotional intent, a musical duet nestling within the narrative of the infant's psychological development. It is the foundation of the infant's intellectual development, the cradle of cultural and artistic experiences, an opportunity to experience feelings of wellbeing, a vehicle for tying emotional bonds and a first and crucial step towards the process of audiation. It is in this way, from a systems view of communication, that I propose a pathway model of music acculturation from which a new generation of infant-musicians could emerge.

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Abstract

In designing a pathway model of music acculturation, it is proposed that infants are born musical, are ready at birth to process musical information and motivated to take part in musical communication. This position contests views that regard musical development as a matter of biological growth, or musical aptitude as an exclusive talent. My position also challenges the perception that organised music-educational settings offer a complete music acculturation process. Such views pay no attention to the fact that infants learn musics of their culture by way of adapted behaviour which emerges as a result of repeated, spontaneous and arousing stimulating experiences. Due recognition also needs to be given to the fact that the daily absorption of a variety of musical literature, the experience of being sung and chanted to, and the experience of being moved to music, are essential for processes of acculturation as the foundational phase of audiation. Thus, the thesis of this study is that acculturation takes place in an intimate reciprocal relationship.

The mother-infant dyad express their emotional bond by means of a non-verbal, musical duet. In experiences of primary intersubjectivity, infants display their inherent musical sensitivity when adapting to the prosodic contour and temporal structure of the mother's sing-song conversation and multi-modal movement. The intuitive conversation is described as infant-directed speech and identified as a musical-emotional narrative. A secondary form of psychological intersubjectivity (companionship) emerges as a result of the dyad's growing reciprocal confidence when attuning to subjective experiences of the other by way of intuitive musical behaviour.

It is argued that musical aptitude develops by way of early and experience-driven reorganisation of neuronal networks. These networks are activated by way of frequent absorption of and interactive response to music of different musical contexts in the home environment. This situation indicates the parental role in unstructured musical guidance of infants.

Applying a bioecological systems approach, this pathway model determines that early competencies, cultural influences and social relations all play roles in foundational processes of music acculturation. Parents should be informed accordingly; therefore basic principles for an appropriate approach towards musical parental guidance (MPG) are extrapolated.

Opsomming

By die ontwerp van ’n roetemodel (*pathway model*) van musiek-akkulturasie word dit voorgestel dat babas musikaal gebore word, dat hulle by geboorte gereed is om musikale inligting te prosesseer en dat hulle gemotiveerd is om deel te neem aan musikale kommunikasie. Hierdie posisie neem stelling in teen sienings wat musikale ontwikkeling as ’n saak van biologiese groei, of musikale aanleg as ’n eksklusiewe talent beskou. My posisie bevraagteken ook die persepsie dat georganiseerde musiek-opvoedkundige omgewings ’n volledige musiek-akkulturasieproses bied. Sulke sienings skenk geen aandag aan die feit dat babas musieke van hul kultuur aanleer deur aangepaste gedrag wat na vore kom as die resultaat van herhaalde, spontane en stimulerende wederkerige ervarings nie. Behoorlike erkenning behoort ook gegee te word aan die feit dat die daaglikse absorpsie van ’n verskeidenheid musiekliteratuur, die ervaring van sang en dreunsang en die ervaring om beweeg te word op maat van musiek, essensieel is vir prosesse van akkulturasie as die basisfase van oudiëring (*audiation*). Die tesis van hierdie studie is dus dat akkulturasie plaasvind binne ’n intieme wedersydse verbintenis.

Die moeder-baba-paar druk hul emosionele band uit deur middel van ’n nie-verbale musikale duet. In ervarings van primêre intersubjektiwiteit toon babas hul inherente musieksensitiwiteit wanneer hulle aanpas by die prosodiese kontoer en die temporele struktuur van die moeder se sang-gesprek en multi-modale beweging. Die intuïtiewe gesprek word beskryf as kindgerigte spraak (*infant-directed speech*) en geïdentifiseer as ’n musikaal-emosionele narratief. ’n Sekondêre vorm van psigologiese intersubjektiwiteit (samesyn) kom tot stand as gevolg van die paar se groeiende wedersydse vertroue wanneer elk ingestel raak op die subjektiewe ervarings van die ander deur middel van intuïtiewe musikale gedrag.

Dit word aangevoer dat musiekaanleg ontwikkel deur vroeë en ervaringsgedrewe herorganisasie van neuronale netwerke. Hierdie netwerke word geaktiveer deur gereëlde absorpsie van en interaktiewe reaksie op musiek van verskillende musiekkontekste in die huis-omgewing. Hierdie situasie wys op die rol van die ouer in die ongestruktureerde musiekleiding van kinders.

Deur ’n bio-ekologiese sisteme-benadering toe te pas, bepaal hierdie roetemodel dat vroeë vaardighede, kultuur-invloede en sosiale verwantskappe almal ’n rol speel in die basisprosesse van musiek-akkulturasie. Ouers behoort dienooreenkomstig ingelig te word; daarom word basiese beginsels vir ’n toepaslike benadering tot musikale ouerleiding afgelei.

Keywords

Music acculturation, musical predispositions, audiation, infant-directed speech, dyad construction, primary intersubjectivity, secondary intersubjectivity, neuronal networks, early learning, musical parental guidance, musical literature, bioecological systems approach, appropriate practices, non-verbal processes.