MOVE TO THE MUSIC

Understanding the relationship between bodily interaction and the acquisition of musical knowledge and skills in music education

Beweeg op de muziek

De relatie tussen lichamelijke interactie en de beheersing van muzikale kennis en vaardigheden in muziekeducatie

Proefschrift

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Let your body move to the music.
Let your body go with the flow.

- Madonna, Vogue (1990)

Preface – Music is in the mind: how my body got removed from learning and how I reversed this

As a piano student at the conservatory, I was a huge fan of Bach. It was with great fervor and determination that I studied Bach's work. During my weekly class, the teacher noticed something odd. Emerging from under the polyphonic structures of Bach's work, there was a constant, regular beat produced by my foot, holding the complex, autonomous melodies together. Despite regular warnings from my teacher, pointing at the annoying nuisance my foot produced, I couldn't help but involving my body in the learning process. It was partly habitual and partly deliberately studied. After a few weeks of consecutive warnings, the teacher stopped my feet from moving, turned his head to me with a determined look in his eyes and said: "music is in the mind." Regardless of what my teacher said, I felt the music in my body.

This anecdote is exemplary of learning processes in which the mastery of knowledge and skills is considered a cognitive endeavour. The body is an obstacle that needs to be tamed. The classic division between body and mind influenced our educational system and ways of knowledge transmission (Bowman & Powell, 2007). But what if children and students were to allow their body to be fully included in the musical learning process, as an equal partner to the mind? This is a music educational question, and yet it is an allegory of a broader question about the role of the body in learning processes in general. In this study, I will explore the role of the body in musical learning processes with the specific aim of understanding the relationship between bodily movements and the mastery of knowledge and skills. At a broader level, this study seeks to contribute to learning and teaching in general in which the body is celebrated and used to its full potential.

With two case studies in Nepal and the Netherlands, I examine how bodily interaction is conducive to the acquisition of musical knowledge and skills. The large datasets compiled for this research were collected through fieldwork in Nepal and the Netherlands. With an extensive amount of video material, observations, and interviews, I strive to present two unique case studies on musical learning. Both complementary case studies show how young musicians acquire musical knowledge and skills by sensing the other, through embodied learning strategies.

This dissertation is the result of a musical journey that started about a decade ago. In 2007 I embarked on a plane from Amsterdam to Kathmandu. In an attempt to broaden my musical horizon, I left my secure job as a music teacher in the Netherlands. Enticed by the unknown adventure, I accepted a position as a piano teacher and teacher trainer in Kathmandu. During my work as a teacher, I discovered that my method of teaching often fell short. Against the backdrop of a conservatory training, I desperately taught my students to read the notes. But whatever I tried, the notes were ignored. Every week, the students politely requested me to play the piece for them. By

doing so the students dexterously circumvented the notes on the sheet music by making a sound recording while focusing on my hand movements on the piano. Back in 2007, smartphones were not yet widely available in Nepal, or at least they were the reserve of the upper class alone. My students were dependent on sound recordings coupled with visual data, stored as a memory from the music class. Week after week I got increasingly aware of the pivotal role of my visual example and the sound recordings for the learning process. Not the cognitive comprehension of written notes, but the auditory input of a sound recording, the visual input of my hands on the piano, and my swaying body on the beat, served as the mainstay of learning for my students. This shook the foundations of my own educational belief systems. I had spent my formative years at the conservatory actively removing my body from learning, as most of my classes were geared towards cognitive learning. Once in Nepal, I suddenly realized that the body played an essential role in learning. This realization formed the driving force and inspiration of my quest to reverse the Cartesian split and find the links between bodily involvement and the mastery of music. Back in 2007, the realization that the body plays an important role in learning was a hunch and not substantiated by any data. A decade later, I proudly present my study on the role of the body in musical learning processes.

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If I had to pinpoint a particular moment in time that caused a chain of events leading towards this dissertation, it was my impulsive decision to go to Nepal in 2007. It is fair to say that my musical adventure in Kathmandu, that continues up till this time of writing and probably many more years to come, has been very formative in many ways. Living, working, and doing research in Nepal has taught me so many valuable life lessons, not the least to adapt to a different culture. But above all, it has changed my way of teaching forever. At first, my teaching experiences were not always compatible with my inner educational values. My tight lessons plans, schedules and textual approach were at odds with the oral and visual ways of learning of my Nepali students. Consequently, my students' learning preferences challenged my way of teaching and sparked curiosity to investigate a different approach. It chased out some persisting ideas about music education and led to a reflective attitude towards my own educational practice, resulting in a more embodied way of teaching. For this, I am forever grateful to my Nepali students, in particular those whom participated in this study. I would especially like to thank the students and teachers of the different music schools taking part in this study: Nepal Music Centre and Kathmandu Jazz Conservatory. They made my fieldwork truly rewarding. After cycling through the heavily polluted city of Kathmandu at least 6 times a week – never tell a Dutchman not to cycle, even if cycling is life threatening – I arrived at the music schools and was met with so much hospitality and willingness from the students to share their learning experiences. Without any hesitation, the teachers invited me in their classes and accepted my role as an observer almost instantly. At first, my presence was reason to organize band presentations and concerts, which led to some cultural misunderstandings. Instead of observing their daily musical learning experience, I was the onlooker of a rehearsed band program. After explaining that I was especially interested in their natural, daily life engagement with musical learning, I became part of the band as observant. In many ways, this cultural misunderstanding is indicative for the open and flexible culture of Nepal: if there is a researcher coming from the Netherlands, they just change the schedule and organize a concert. This flexibility made my fieldwork successful and invaluable to my research. At the same time, Nepal can be challenging as well. No electricity, no water, no teachers, no students, no band schedule, bumpy roads or no roads at all, etc. But that goes beyond the scope of this dissertation. Nepal, students, and teachers: danyabad!

For my second case study, I stayed much closer to home and did research in Amsterdam. Every week I cycled through the city towards the music center called MuzyQ. This time I cycled on well planned bicycle lanes and could visit the band rehearsals during scheduled hours. It is safe to say that this type of fieldwork corresponded better with my busy and tightly scheduled European life.

Coming back from Nepal, I was somewhat apprehensive of the fact that music schools in Amsterdam might not want a researcher gazing at their students and teachers for months. This proved to be wrong on many fronts. After the first introduction talk with the band coordinators of the music schools, I was warmly welcomed to observe their band classes and performances. First of all, I would like to thank Dutch School of Popular Music, the students, and the teachers for their time and openness during the interviews and rehearsals. It was an absolute pleasure to see the great performances you all worked so hard for during the rehearsals. I sincerely hope that some of you fulfilled your musical aspirations and embarked on a professional music career.

A special thanks goes to the music foundation Mo-Music Activation and the band Moxi Delight. Your swinging music was a treat to my ears. For this foundation, I wasn't a mere spectator, but also involved in editing work for their website and a sparring partner for educational design processes. Besides the weekly visits of the band rehearsals, I joined the band for studio recordings, performances in various venues, and informal gatherings. Thanks to all the band members for having me around all the time. Your openness and willingness to share your musical learning experiences are highly appreciated. This successful fieldwork was made possible by the inclusive approach of Robin van Geerke, a great musician and teacher.

While this dissertation is mainly about the learning process of students and their path towards musical growth, in the process of conducting this research, I walked my own avenue of personal growth as well. To be honest, as a child I could have never imagined attending university, let alone once being able to obtain a PhD. As a young student I would never be termed a high-achiever at school. With diligence, however, I did my school work, and slowly worked my way up from MAVO (lower vocational studies) to HAVO, to HBO, University, and finally plunged into the world of academia by writing my PhD. In the Netherlands, this stepwise educational route is referred to as 'stapelen' and is best described as an accumulation of obtained diplomas from a 'lower' to a 'higher' school level. As this is not common in the academic world, I feel the need to briefly explain my educational detour. I come from a warm and hardworking family with an emphasis on creative skill development rather than valuing academic achievements. Above all, my parents promoted growth and development by teaching me determination, perseverance, and self-efficacy. Funnily enough, the latter is the best predictor for academic achievement[1]. I want to thank my parents Evert and Wil van den Dool, because, as it turns out, the promoted development of determination and self-efficacy boat especially well with the long trajectory of finishing a PhD project.

During the whole PhD process the constant factor was my supervisor, Koen van Eijck. I am very grateful for his guidance and his meticulous way of providing supportive feedback. Above all, he

[1] For example, a large meta-analysis of 109 studies confirmed the incremental contributions of self-efficacy over that of socioeconomic status (Robbins, 2004).

challenged me to widen my academic horizon. At first, I was convinced that a qualitative approach with the emphasis on a rich description of the observed process, by seeing through the eyes and feeling with the body of the musician, rather than quantification in the collection of data around the musical learning process, would be the preferred method. After collecting more than 20 hours of video recordings, I slowly started to realize that the coding process of the data would be insurmountable without the additional help of a quantitative approach. Venturing into the unknown, Koen patiently guided me through the wonders of quantitative research. Thank you for this opportunity!

Thank you Erasmus University and in particular ESHCC for your trust in me as a teacher and PhD-candidate. Most importantly, I want to express my appreciation for the students I had over all those years I worked for ESHCC. Your critical reflection on my articles were invaluable. A special thanks goes to Niels van Poecke and Janna Michael for either being my officemate or PhD-candidate support system. Thanks for the supportive conversations.

Last but not least I want to thank my life partners, Shaun and Sjoerd. You have been a great support to me over all those years. Thank you Sjoerd for your critical reading and involvement in my research. You were always prepared to critically reflect on my ideas and often invited me for walks whenever I was on the verge of a writers' breakdown. Thank you Shaun for being there as a native speaker. Chasing out the Dunglish errors was invaluable. More importantly, you are a great thinker and discussing my findings with you served as a touchstone for the theories put forward in this dissertation. I also want to thank my sister Andrea, whom I admire a lot for her determination. Thank you for all the Monday nights in Rotterdam. Finally, I want to thank my son Zalmai for simply being here. Your presence made me realize that nothing is more important than seeing you grow up happily. I will always be there for you.

Chapter 1

Introduction: The premises of embodied learning
Outline of this study

Introduction: The premises of embodied learning

This study revolves around questions on musical knowledge and skills acquisition with embodied learning strategies. Embodiment is, in its most general sense, the use of the body as a learning tool in musical learning processes. Rather than celebrating cognitive capabilities over bodily learning, which is the mainstay for most educational practices, I focus on bodily communication and its pivotal role in learning. This conversion provokes reflection on the often disregarded body in learning processes and sheds light on the manifold ways in which we can mobilize the body as a successful tool for learning. For this research, I draw on previous studies on embodiment outside the realm of music. In what follows, I tie together embodied theories which shaped my premises on embodied learning in music education.

In the traditional Cartesian paradigm, perception is understood as the processing of unidirectional flows of information, images, symbols or neural configurations, generated by the brain to create a representation of the world (Hutto 2009; Neisser 1976). In conjunction with research in linguistics, cognitivist musicology maintains that auditory information is processed in specific areas of the brain (Purwins et al. 2008). The localization of specific brain modules devoted to musical understanding provides us with a suitable model explaining how perception and learning works within the brain. This passive mental representation of the external musical world processed internally, is assumed to provide us with knowledge. The attempt to reduce music learning to specific brain functions and structures inside the head, seems to discard the body as a whole. In its most general sense, cognitivist accounts on learning still dominate the field of (music) education.

In an attempt to refute the Cartesian paradigm, many scholars advocate that the brain is situated in our entire body and fully embedded in the world (Thompson 2005). Recently, embodiment as an educational theoretical concept has been on the rise. Epistemologically and ontologically, embodiment takes on very different meanings across various disciplines ranging from embodied phenomenology to cognitive neuroscience. On the common ground between these various fields, embodied cognition could be roughly explained as the dynamic interplay between neural processes and bodily action (Bowman, 2004; Clark, 2008; Leman, 2008; Thompson 2007; Shapiro 2010, 2014; Wheeler, 2005). In this profoundly different paradigm, cognition is considered a result from the dynamics between the body and the brain. Due to the multiplicity of notions on embodiment in various fields, I will not attempt to mark out a conclusive and definitive examination of theories on embodied learning. Through taking an excursion into how students deploy their body as a communicative learning tool, I confine my theoretical context to the exploration of embodiment in relation to the acquisition of musical knowledge and skills.

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The emphasis on the body as a learning tool in this study is by no means an attempt to privilege the body over the mind. As Jordi (2010) observes, preference of the body as an essential "site of learning" over the mind does nothing else than retaining the body-mind dualism, albeit upturned. In this study, the focus on the body is not an inversion of the Cartesian split, but mainly an endeavor to level the playing field by shedding light on the largely unexplored role of the body in the musical learning process. Premised on this assumption, I consider learning as contingent on both the body and the mind as a whole. The brain is firmly rooted in the body through a vast network of neural pathways. Cognitive processes that are grounded in patterns of action result from perceptual motor capacities which constitute the inseparability between body and mind (Bowman, 2004).

In this study, the inseparable body and mind operate within a specific environment. The triangular relationship between body-mind-environment, coined as "emplacement" (Howes, 2005; Pink, 2011), demonstrates how a shift from the dual relationship between body and mind towards a moving body within a living, animate environment, provides insight in the ways the body learns through movement and by sensing the world in constant interaction with other learners. Applied to this study, musical learning is grounded in the correspondence of animate movements between body-mind-environment.

Another important premise of this study is the conviction that learning is a sequential process. Jordi (2011) heedfully points out that educational researchers should be cautious to seek the "moment of learning" as a "cognitive flash" (Jordi, 2011: 9). Rather than pinpointing the moment of cognitive awareness, learning should be understood as a process that epitomizes a string of events, from bodily communication and sensorial experience to cognitive awareness. For understanding how processual embodiment works, it is useful to draw from Damasio's (2000) theory on consciousness. He argues that the brain constructs mental patterns, designated by Damasio (2000) as the images of an object. The construction of an image includes more than sight alone and is the result of sensory modalities, including touch, sound, taste, olfaction, and inner body senses. Human consciousness encompasses the human sense of self, constituted by a constant process of internal and external stimuli. Consciousness is made of a continuous flow of mental patterns or images. Therefore, our experiencing in the world and sense of self are not reducible to the moment of cognitive awareness, but the result of a sensory sequential process. Put differently, while we learn we continuously interact with the world through movement and sense making. As we engage with the world, we mix our external experiences with internal thoughts, emotions and feelings in a continuous process of learning.

Premised on Damasio's work, I believe that the body and the senses constitute musical learning as a sequential process. The role of the teacher or peer, conveying musical information via bodily communication sequences, is indispensable. These embodied messages enable the perceiver

to approximate the right bodily movements through active imitation. I consider acquisition of knowledge and skills as the result of a sequential process of learning. Rather than focusing on acquisition as an isolated event, I study the whole embodied process leading towards the moment of mastery. Premised on the above, I intend to map out the whole sequential process of embodied learning to contribute to the understanding of how young musicians acquire musical knowledge and skills.

Outline of this study

This dissertation is a collection of 4 articles, each with its own introduction, research question, theory, methodology, results, and conclusion. The overarching topic of embodied learning glues the separate chapters together. Therefore, there is some theoretical overlap between the chapters. Each chapter logically emerges from the previous one. The main goal of this research is scrutinizing the music transmission and learning process of young musicians in band formations in informal learning settings in Nepal and The Netherlands. This study seeks to understand the role of the body in musical learning processes in order to contribute to the understanding and implementation of embodied learning in formal music education.

In the next chapter I present the first case study in Kathmandu, Nepal. It demonstrates that the merging of musical styles requires blending modes of appropriation or the merging of learning strategies and skills, referred to as intermusicality. It seems that, for teenagers in Kathmandu, unfamiliar musics such as jazz and rock are not always accessible. Their local music holds a prominent place in their soundscape. Due to daily absorption and immersion in local musical material, this local music becomes ingrained in their musical bodies. Nevertheless, popular music plays a major role in youth culture, increasingly so in developing countries (Greene, 2001). Driven by curiosity and encouraged by gatekeepers such as family members, friends, the Internet, and teachers, youngsters overcome various constraints and actively explore musical practices of unfamiliar musics through innovative blending of learning strategies into three degrees of intermusical learning. Intermusical learning highlights the important implication for music education in general that youngsters do not learn musics with a distinct set of separate musicalities (O'Flynn, 2005), but acquire different music styles with a blended set of learning strategies. Understanding these blended learning strategies contributes to a musical learning environment where teachers, instead of deploying a fixed method of musical learning, give way to blended, intermusical methods of learning that improves the learning process.

As chapter 2 advances the finding that the body is an important tool in the musical learning process, in the third chapter I demonstrate *how* the body plays an essential role in the learning process. The use of various forms of interaction, gestures, and entrainment demonstrate a highly developed deployment of the body to learn music. The findings of the video-analysis of this case study allow me to hypothesize that musical knowledge arises out of bodily interaction between the band members. There seems to be a link between melodic, harmonic, rhythmic aspects of the music, the forms of interaction, gestures, and entrainment, and the acquisition of musical knowledge and skills. Despite empirical evidence claiming that hidden emotional, thus bodily processes, underlie our cognitive decision making and social functioning, the role of the body in learning processes seems

largely ignored in education. This study aims at challenging the body-mind dualism with empirical research, claiming that embodiment of information significantly enhances the acquisition of knowledge. I investigate how bodily learning in the form of interaction, gestures and entrainment results in the acquisition of musical knowledge and skills. The outcomes are based on data collected in Kathmandu, Nepal, from 20 band rehearsals. I analysed 12 video recordings using *Transana Professional 2.60*, which allowed me to present data in keyword sequence maps. I exported the qualitative data set into SPSS for further quantitative analysis, testing the associations between musical communication (independent variables) and musical knowledge and skills (dependent variables) with a binary logistic regression. Derived from the analysis, two patterns of learning emerged, indicating that musical knowledge and skills arise out of bodily interaction between musicians. Understanding this link provides insight in the way young Nepali musicians address the modern world of music with local music learning tools.

In the fourth chapter, I present the second case study. After discussing the relevant outcomes of my first case study in Nepal, I decided to conduct another case study closer to home. The rationale behind this was that moving and learning bodies were not unique to Nepal, but a universal phenomenon. To assess to what extent my earlier findings apply to musicking in the Netherlands, where musical socialization is arguably quite different from what I observed in Kathmandu, I decided to study embodied learning in Amsterdam. Rather than explicitly comparing Nepal with the Netherlands, the final case study in Amsterdam seeks to be complementary to the previous one in Kathmandu. The fourth chapter aims at theorizing the role of the body, and in particular of the senses, as tools for musical learning. I first study the deployment of musical interaction and sensory tools during a learning sequence. Second, I investigate prioritization and merging of different senses within the learning sequences. The exploring and moving body exchanges information through somatic modes of communication with other bodies (Howes, 2005; Jackson, 1983). To extrapolate on sensory modes of communication between learners, I borrowed Howes' (2005) notion of sensory relations. During the learning process, students follow a sequence in which they merge the senses and prioritize sensory activities depending on the task. Drawing from Howes' merging and multi-directionality of the senses, coined as ´intersensoriality´ (Howes, 2005), it stands to reason that young musicians merge and prioritize the senses to master certain musical skills. Finally, I studied the relation between intersensory learning and the acquisition of musical knowledge and skills. I analysed 751 video clips by coding each musical activity with musical interaction forms, sensory modes of learning, and, at the end of the learning sequence, musical acquisition.

To substantiate claims on musical acquisition, I analysed the relation between musical interaction and sensory learning on the one hand and musical acquisition on the other hand by using a cross tabulation analysis. This quantitate tool allows for analysing the possible relationship

between bodily learning and the acquisition of musical knowledge and skills. To fully contextualize the musical learning process of the band members, I extrapolated on episode reports. These reports serve as rich, descriptive, textual representations of the rehearsals and provides us with an elaborate contextualization of the musical learning process. In sum, the fourth chapter aims at understanding patterns of intersensory learning which gives us access to how young musicians make sense of their musical world.

As the previous chapters shed light on the granularity of bodily communication patterns and sequences of sensory experiences in relation to musical skill acquisition, chapter 5 offers a possible blueprint for the implementation of the findings in a formal music educational setting. Fuelled by evidence in support of the importance of awareness of the essential role of the body in learning and teaching (Bremmer, 2015; Bowman, 2004; Bowman & Powell 2007; Yang & Damasio, 2007; Fenwick, 2003; Glenberg, 2004, 2008; Michelson, 1998), I attempt to mark out recommendations for an embodied curriculum in formal education. To make this more concrete, I advance arguments and key foundations for embodied learning and present principles of embodied teaching that constitute didactical foundations for embodied learning in the classroom. Didactical change, however, is challenging and the road towards an embodied curriculum is not necessarily straightforward. Therefore, I explore possibilities and constraints for a more rigorous curriculum change in which the body is central to the learning process.

Chapter 2

Blended modes of music learning:
Shaping Intermusicality in Kathmandu

Blended Modes of Music Learning: Shaping Intermusicality in Kathmandu[2]

Introduction

The vast majority of studies on musical learning processes focus on the acquisition of knowledge of a single musical culture (Blacking, 1967; Merriam, 1964; Campbell, 2001). In this study, I am particularly interested in the process of knowledge and skills acquisition in various music systems. I investigate how young musicians who grew up with one prominent traditional local music system acquire knowledge and musical skills in an unfamiliar music system later in life. "Unfamiliar music," as it is used here, includes the musical immersion process in jazz, rock, and popular music rather than absorption of and immersion in local traditional folk music. Unfamiliar music is unfamiliar in terms of sound, music theory, technical aspects, and performance practices. Moreover, music education in this unfamiliar system is less accessible. The local traditional system is easily accessible and becomes familiar through frequent exposure, as it dominates the daily soundscape. The tools young musicians have at their disposal to acquire knowledge on music that is unfamiliar to them, such as jazz and rock, are explored by focusing on learning strategies and practices of music making in an unfamiliar music system. The issue of unfamiliar musical knowledge acquisition raises the question of how and to what extent youngsters, being immersed in their specific cultural music system, are able to fully grasp an unfamiliar one. Demorest and Morrison's (2008) study on music memory performance suggests that the cognitive schemata to acquire unfamiliar musics are culturally derived. Exposure, however, in the form of listening and training may influence the degree to which one can understand unfamiliar musics. Based on these findings and cognitive music studies claiming that the ability to detect nuances in different music systems decreases with age (Trainor & Trehub, 1992), I investigate which possibilities and constraints young musicians face in acquiring specific musical knowledge of unfamiliar musics and how they exchange and transform music traditions and performance practices into hybrid musical objects through blended learning strategies.

These issues do not merely concern individual learning strategies but also touch on debates on globalization and hybridization. Scholars such as Appadurai (1996), Bennett, Shank and Toynbee (2006), and Born (2000) argue that the world is no longer divided into culturally homogeneous entities. In this world of transnational flows, musics and musical practices cross-fertilize, fuse, and

[2] This chapter is based on the following publication: Van den Dool, J. (2016). Blended Modes of Music Learning: Shaping Intermusicality in Kathmandu. *Asian Music*, *47*(2), 84-113.

exchange material, resulting in the formation of new kinds or hybrid forms of musical objects (Frith, 2000; Russell, 2006; Stokes, 2004). Consequently, we could argue that with the transnational flows of musical objects, the learning process travels along and fuses into various hybrid forms of learning.

Terms such as "hybridization" and "cross-fertilization" may suggest that learning hybridized musics with hybrid learning strategies is the inevitable outcome of the transnational flows to which music students are subject. On a micro-level, however, these hybrid musical objects are not always present in the daily soundscape of listeners. Young musicians need to actively search for places where this music is performed and learned. Moreover, the acquisition of hybridized and unfamiliar musics does not come automatically with globalization but requires an active investment in unfamiliar musical knowledge and skills. Young exploratory musicians face social constraints and must overcome musical challenges through active learning processes and the innovative blending of learning strategies.

How young musicians acquire knowledge in jazz and rock is analyzed through a case study carried out in Kathmandu, Nepal. Young musicians actively search for possibilities to acquire skills and knowledge in this unfamiliar music system by learning from friends, family members, music schools, and instruction videos on the Internet. Observing the other is an essential tool in this learning process. Observing adults, copying musical technical aspects, and imitating unfamiliar musical material to learn music are not unique Nepali practices. Everywhere in the world youngsters learn to make sense of music by observing and imitating adults and friends (Green, 2002; 2008; 2011; Rice, 2003). However, Nepali youngsters are not immersed in jazz and rock music from childhood onward and need to build their musical skills and knowledge from scratch. Youngsters in Kathmandu immerse themselves in jazz and rock by using the same learning strategies they deploy in Nepali music. They transfer specific practices and learning strategies from their local music culture into unfamiliar systems, a process defined as "intermusicality," a term coined by Monson (1996). In this study, however, intermusicality entails more than the specific practices and methods of transmission from one music style or performance context to another. In addition to intermusical traffic of learning strategies, youngsters in Kathmandu actively create new learning strategies. Studying the intermusical transfer between various music practices and the creation of new learning strategies gives insight into how intermusicality is performed and deployed as an essential tool in the acquisition of a new music system.

This case study presents two core findings. First, the assumption that globalization and hybridization processes make the acquisition of hybridized and unfamiliar musics accessible or easy needs theoretical refinement. Hybrid musical objects are not always part of the daily soundscape and therefore harder to access. As a consequence, during the process of acquisition of unfamiliar music, teenagers face constraints and various musical challenges. Second, mastering unfamiliar musics

requires active immersion, support by gatekeepers, observation and imitation of both musical and performance practices, theoretical knowledge, and intermusicality. The shaping of musical identities and modes of learning are not bound to separate musics but rather based on a blending process of various learning strategies placed in a new framework.

In this chapter I first provide a theoretical framework on cultural-specific musical attunement and propose a theoretical refinement on musical learning processes of hybridized and unfamiliar musical objects. Next, I theorize the distinction between absorption and immersion. This section concludes with theorizing intermusicality, aiming at a broader definition of musical learning. I then present the results of my analysis by illustrating the core learning strategies of local music learning. Subsequently, I demonstrate how Nepali youngsters immerse themselves in unfamiliar musical practices through instruction videos and teachers. I consider the role of music theory in the learning process; music notation and theoretical knowledge seem to be at odds with local learning strategies. Intermusicality, therefore, proves to be a solution to learn unfamiliar musics. In conclusion, I demonstrate how active blending of existing and novel learning strategies into an intermusical learning process is conducive to mastering unfamiliar musics through three degrees of intermusicality, eventually leading to the full acquisition of skills and knowledge of unfamiliar musics.

While this case study focuses on the particularities of music learning in Kathmandu, where students prioritize audible learning, it contributes to understanding any process of intermusicality where youngsters explore various musics with blended learning strategies.

Theoretical Background

It seems to be a universal phenomenon that infants start to make sense of their cultural musical sounds from a very young age and prior to any formal music education. They learn to distinguish musical sounds from other sounds, remember familiar tunes, and separate their local music system from other musics through transmission from one generation to the next (Campbell, 2001; Dissanayake, 2000; Trainor, Marie, Gerry, Whiskin, Unrau, 2012). Research on the perception of speech and tonal patterns shows that infants between 5 and 11 months are particularly sensitive to pitch contours and rhythmic patterns. Infants discriminate tone sequences and pitch changes, enabling them to categorize tunes and tone sequences by their contours (Chang & Trehub, 1977; Trehub, Bull, & Thorpe 1984; Trehub, Thorpe, & Morrongiello 1987, cited in Trainor & Trehub, 1992; Honing, 2009).

The skill of listening to music, referred to as "listenership" (Elliott, 1995), is usually ascribed to adults. Research, however, proves that infants outperform adults in detecting disruptions in the key of a melody or changes that are coherent with the harmonic structure of that melody (Trainor & Trehub, 1992). Trehub and Hannon (2006) argue that this outperformance on both types of change is due to young children's "lack of culture- specific tonal knowledge (Ibid.: 81)." These studies demonstrate that infants can easily detect differences between their own culturally specific tonal structure and other musics, whereas adults lose this ability over time. As soon as children are immersed in the specific music of their culture, their ability to detect nuances decreases. When children attend elementary school, they become immersed in culturally specific tonal and harmonic structures (Dowling, 1999, cited in Honing, 2009). Innate cognitive skills enable infants to detect nuances in all musics. However, their rudimentary grasp of musical structures are gradually replaced by culturally specific knowledge of musical phrasing, rhythm structures, and intonation (Dowling, 1999). Infants acquire culturally specific musical knowledge and become sensitized to a certain music system by observing and imitating adults during daily life activities, such as structured musical games, in a playful, unstructured way. During this process they actively engage with peers, being shaped and concurrently shaping their culture (Campbell, 1998; 2001, Whiteman, 2013). Throughout the period from elementary school onward, children are structurally exposed to culturally specific music through frequent repetition of infant songs, a process usually referred to as enculturation. The process of enculturation in the local music system of a child, varying from informal playful learning to formal specialized training, combined with socialization through shared beliefs, plays a prominent role in the musical learning process (Jorgensen, 1997). Usually, the intergenerational enculturation process focuses on a single, dominant music system (Slobin, 1993, cited in Campbell, 2007).

Enculturation, therefore, suggests a rather truncated process of becoming encultured in a certain music system as if doing so is the end goal: a fixed and specific base for cultural identity. Teenagers, however, have exploratory natures and are increasingly exposed to endless streams of hybridized musics in their soundscape. As Appadurai postulates, "The landscapes of group identity—the ethnoscapes—around the world are no longer familiar anthropological objects, insofar as groups are no longer tightly territorialized, spatially bounded, historically self-conscious, or culturally homogeneous. . . . The ethnoscapes of today's world are profoundly interactive" (1996: 48). In this world of transnational flows, hybridity reveals itself as an expressive performative practice in which actors reconstitute cultural forms (Longhurst, 2007) and inscribe their everyday meaning onto them (Bhabha, 1994, cited in Shim, 2006). Hybridity is a "creative cultural rearticulation" (Born, 2000: 19), a "transformative zone" (Russell, 2006: 175) in which performance practices and elements from other traditions are recontextualized. Teenagers find themselves in a partial culture: "the contaminated yet connective tissue between cultures" (Bhabha, 1996: 54). Consequently, in this amalgamated, "in-between" musical world they might gradually replace their local culture, imposed by adults, with other, hybrid music systems.

Echoing Appadurai's theoretical framework, various studies offer evidence on how teenagers reconstitute cultural forms, recontextualizing musical technical and performance practices from other traditions (Mitchell, 2001; Russell, 2006; Shah, 2006). These studies provide insight in the negotiation and collaboration between cultural forms and learners alike. These scholars demonstrate how learners transform various musics into hybrid forms, musicking in an already hybridized soundscape. As this study indicates, however, local music and unfamiliar music do not always meet and merge automatically. For music to become creatively rearticulated, learners need to actively search for unfamiliar musics before the recontextualization and learning process begins.

Absorption and Immersion

In learning a musical culture, two important factors are at play. Hall (1992) postulates that acquired and learned culture is partly unconscious and at the same time coincidental with conscious learning. The daily rhythms of a culture, gender roles, body movements, and manners of speech are "learned but not taught" (Rice, 2003: 65). This implicit learning, acquiring knowledge without being completely aware of it, is fundamental to acquired culture. I refer to this process as "absorption." Learned culture, in contrast, can be highly structured (formal education), partly guided (informal but with instruction), and enculturative (natural learning without any form of instruction) (Campbell, 2001). This group of learners has the same starting point but actively participates in musical learning, described as "immersion."

There is little consensus in the humanities or social sciences regarding the meaning of absorption and immersion, which often seem interchangeable within musicology. Both immersion and absorption describe the process of shutting oneself off from the outside world and entering a state in which nothing else seems to matter (Herbert, 2012). Other researchers describe absorption as an "effortless, non-volitional quality of deep involvement with the objects of consciousness" (Jamieson, 2005: 120) "as opposed to attentional engagement that is goal-directed and effortful" (Herbert 2012: 41). Researchers in music education also seem to lack consensus. Some merely use the concept of immersion to describe the learning process as an active engagement (Campbell, 1998; Green, 2008), whereas others make no distinction between the notions and define absorption as "a total immersion in an activity" (Bakker, 2005). Pine and Gilmore (1998) conceptualize immersion as an active engagement in which the actor physically becomes a part of the (musical) experience itself by actively entering into it and absorption as the actor more passively experiencing the music that enters her or his senses.

I use notions on absorption and immersion from various fields. In the context of this study, absorption is conceptualized as the process of consciously and unconsciously picking up musical sounds from the soundscape. Listening proves to be a multisensory activity, embedded in daily experiences, with different meanings at different times. Listening to music fluctuates between absorption of "acoustic attributes of music" and musical and cultural sources and associations (Herbert, 2012: 54). Thus, listening to music never wholly occurs on a conscious or unconscious level. It proves to be a continuum of attentively listening to qualities of sound and cultural associations, alternated with distributed attention "of which music is only a part" (Sloboda & O'Neill, 2001: 418). Youngsters in Kathmandu consciously and unconsciously absorb local music by fluctuating listening modes focused on musical material during daily life activities.

According to Csikszentmihalyi (1990), in contrast to absorption, immersion requires interaction between actors and the musical object. As soon as actors actively participate in learning or making music, they immerse themselves in the experience (Pine & Gilmore, 1998). Immersion differs from absorption in the sense that it becomes a predominant conscious engagement on an individual and collective level. The process of immersion entails dedication and a willingness to learn and explore new musics. This form of learning is especially relevant for this study. My respondents are not only listening to music but participating in the learning process by imitation, creation, and performance.

Intermusicality

Learning a new music system requires a set of new learning strategies. Imagine an individual, encultured with Western music notation, trying to master Indian or Nepali music. The person is likely to hold on to his or her own learning strategies. However, South Asian music is predominantly orally transmitted (Bor & van der Meer, 1982; Schippers, 2007), inevitably creating difficulties in the learning process. In order to acquire knowledge of another music system, a student needs to jump through a series of musical hoops. In ethnomusicological studies this process is referred to as "bi-musicality" (Hood, 1960). Mantle Hood extensively used this term, analogous to and borrowed from "bilinguality" to indicate the acquisition of musicianship and performance skills of "cultivated" non-Western music (Titon, 1995). Hood and Titon present bi-musicality as a separated learning process of two different musical systems. I, however, argue for a greater overlap between different learning strategies in various musical languages, resulting in a broader approach to the definition of musical learning.

According to O'Flynn (2005), children negotiate daily between various musical learning settings, using their musicality in the most flexible and inclusive sense. Largely due to the Internet, children are able to become multi-musical, vastly increasing their knowledge of various musical styles (Nettl, 2005). They engage themselves with a broad range of musics and learning strategies, knowingly and unknowingly transferring specific practices and methods of transmission from one music style or performance context to another (Monson, 1996). This process of intermusicality can be applied to our understanding of the multifarious field of music learning, without associating a specific learning strategy to a particular music style (O'Flynn, 2005).

Intermusicality is more than mere transfer of learning strategies from one music to another. In addition to this transfer, youngsters actively shape *new* learning strategies. Studying the intermusical transfer between various music systems and the shaping of new learning strategies gives insight into the way intermusicality is performed and deployed as an essential tool in the process of musical learning. I will investigate how young Nepali musicians who grew up with one prominent traditional local musical system, acquire knowledge and musical skills in unfamiliar music later in life through intermusical blended modes of appropriation in which bodily information of peers played an essential role. The tools young musicians have at their disposal to acquire knowledge on music that is unfamiliar to them are explored by focusing on intermusical and bodily learning strategies.

Method

Since 2007, I have been involved in the music (education) scene in Kathmandu as a performer and music teacher. My substantial experience in the field of music education in Nepal proved to be a valuable asset in gathering and analysing data. The data for this research are derived from a five-month field study in 2012 in Kathmandu. Subjects for this study are students in bands from two different music schools in Kathmandu: Nepal Music Centre (NMC) and Kathmandu Jazz Conservatory (KJC). These bands consist of 12 amateur musicians between 14 and 20 years old, selected during my first field trip in Kathmandu in February 2012. Other subjects for this study are 11 young musicians and three teachers whom I interviewed in and around four different music schools and live music bars in Kathmandu. The music students follow courses in pop, jazz, and rock music; music theory; and band practice and come from a middle-class socioeconomic background.

The outcomes of this study are based on an analysis of 10 in-depth interviews, 1 focus group interview, and 11 informal interviews. The focus group and informal interviews consisted of three main topics: local music, gatekeepers, and acquisition of unfamiliar musics. After transcribing the interviews, I examined the data from a "bottom-up" approach (Creswell, 2012). First, I explored the data to see whether certain themes emerged, which yielded, for example, immersion and blended learning. Thereafter, I coded each theme into subcategories. *Immersion* includes musical technical learning by ear, copying of technical aspects, and learning from music theory. *Blended learning* accommodates local learning strategies, unfamiliar learning strategies, and intermusical learning.

In addition to data collection through interviews, I recorded 20 band rehearsals and 5 informal practices. In total I collected 178 video clips, varying from 1 minute to 55 minutes, with a total amount of 14 hours. For collection of the recordings, the camera was alternately positioned in full shot to create the bigger picture and zoomed in on individual musicians to grasp particularities of musical learning. For illustrating the arguments put forward in this article, I selected five video fragments, which are available online. A QR code directly links the reader to a video.[3] This technology was introduced by Warmerdam (2012) to increase accountability in the social sciences. Access to these videos enables the reader to hear and see the immersion processes described.

[3] Use your smartphone to scan the QR code.

Results: Learning Process of Unfamiliar Musics

Absorption and immersion in local music form the undeniable point of reference of musical understanding. However, Nepali traditional music is not the only music in the daily soundscape of youngsters in Kathmandu. The rich musical tradition of Nepal is often divided into two broad categories: the northern part, defined by pentatonic scales without half tones; and southern music, dominated by heptatonic scales. The musical styles, instruments, and use of scales vary greatly throughout Nepal, which is emblematic of oral culture (Moisala, 2000). From early childhood the respondents in this study were exposed to a wide range of Nepali traditional music. The following examples emerged from the data as most influential for the students.

The first example includes the characteristic wedding bands, present at every Newar marriage ceremony[4]. Their music is based on ragas (scales) and has been influenced by early and ongoing cultural exchange with North India (Moisala, 2000). These wedding bands include, but are not limited to, *bansuri* (flute) players, *madal* and *dhimay* percussionists, and cymbal players. Another example includes the sound of the *sarangi*, a small stringed instrument, famous for its melodic lead in folk songs such as "Resham firiri," which is part of the collective musical memory of every Nepali child[5]. In the third example, many parents tune into film songs, exposing their children to *adhunik* (modern classical Nepali music) and *lok git* (a mix of Nepali folk music and smoothly integrated Western musical elements) (Grandin, 1989; Greene, 2001). This film music, often sung by couples in love, is based on repetitive Nepali pentatonic folk melodies with poetic, longing romantic lyrics, set in idyllic scenes in rural Nepal. Reminiscing on his earliest memories, Abhisek, a pianist, explains: "I

[4] The Newar community migrated into the Kathmandu valley more than two thousand years ago (Pradhan, 2011). Historically, they are involved in trading and businesses and settled in urban areas like Kathmandu, Patan, and Bhaktapur. The Newari community maintains numerically the second-highest urban population (641,963) of Nepal (Government of Nepal, 2014). Music and dance play an important part in Newari religious ceremonies and festivals. Traditionally, occupational musicians occupy the lowest level of the religious and ritual hierarchy (Moisala, 2000). Music is still deeply embedded in Newari culture, based on the popularity of traditional bands like Kutumba and the revival of Newari culture through poems, songs, and even a national anthem (Grandin, 2010).

[5] Translated into English: the gesture of a silk cloth waving through the air

grew up listening to Nepali music, because my dad and mom used to listen to it. When I was a child, I would wake up to Nepali music being blasted through the radio." For him and other respondents, this variety of Nepali music became ingrained in their system through daily absorption. In sum, the gamut to which the students were exposed ranges from pentatonic scales to heptatonic ragas and mixtures of both.

Absorption in a native musical culture shapes our cognitive schemata for processing and recognition of musical information. Our musical memory is formed by daily exposure to culturally specific musical parameters (Demorest & Morrison 2008). Various studies in music cognition show that melodic and rhythmic recognition is the direct result of specific culturally based musical exposure. Those experiences seem to develop our musical understanding and attunement to melodic contours and rhythmic structures (Krumhansl, 2000; 2003; Krumhansl & Toiviainen, 2001; Schellenberg & Trehub, 1999). If we follow these theories, it stands to reason that Nepali youth, exposed to wedding bands, *sarangi*, *madal*, *lok git*, and film music from early childhood, have developed a specific sensitivity toward high-pitched female voices, pentatonic folk melodies, and repetitive 6/8 rhythms. Absorbing their local music, albeit in a largely unconscious way, influences their musical ear and defines a certain harmonic, melodic, and rhythmic sensibility that utterly differs from that of jazz and rock music.

Nepali teenagers acknowledge that local music plays a large role in the development of their musical identity. This "audible badge of identity" (Blacking, 1967: 29), unconsciously picked up from their daily soundscape, is described by youngsters as a feeling of being Nepali, which indicates a certain level of knowledge about Nepali music and its effect on their identity. Rishav, a drummer, clearly summarizes how listening plays a pivotal role in the process of musical learning and the development of a musical identity:

> *"Nepali music is where I come from. I cannot deny and ignore that. I cannot be a jazz musician; I cannot sound like a New Yorker or from some other place. I have my own culture and my own nationality. So I cannot deny that. Nepali music plays an important part in my life. I have grown up listening to Nepali music. So, for example, Gay Jatra [Nepali festival], when I listen to it, it inspires me to go deeper in music. It's a vague answer, but it's that feeling of being Nepali. I feel that I have some originality in this world."*

Rishav acknowledges that he cannot sound like a foreigner. His ears grew accustomed to his soundscape and are undeniably attuned to Nepali music.

The family plays an important role in the absorption of local music: "Whenever you go to festivals, whenever you go to your relatives, someone is playing the *madal* and singing along," Abhisek states. Among others, Sabin, a violin player, expresses his attunement to Nepali musics in a similar vein: "I always like when we had a festival back home; my uncle used to bring a flute with him, and he used to start playing. When he started playing, I was always amazed by the sound." Festivals and family gatherings contributed to cognitive schemata of recognizing the sound of the *bansuri* or *sarangi* and the recognition of the repetitive rhythmic cycles of the *madal*. Their local music culture is being perpetuated and ingrained in people's musical ears.

Some teenagers exceed mere listening and actively immerse themselves in musical learning through interaction with other musicians, peers, or family members. Suyok, a singer, has been exposed to *adhunik* from childhood and observed his father singing ragas (scales): "Maybe I was seven or eight years, and my sister was three years older than me, and we both used to do ragas with him . . . with the help of the harmonium." In the case of Suyok and others, the musical knowledge of the scale is orally transmitted and acquired by observing and imitating a family member. Earlier, Sabin referred to absorbing the sound of the flute played by his uncle during a festival.

Like Indian music, Nepali music is predominantly orally transmitted. After the absorption process Sabin requested his uncle to teach him: "He would give some tips like how to blow the flute. I tried to play [the] whole day at home. The environment was very good for learning. We had lots of new friends coming together, and we learned for almost two hours to blow together. And with that we had our chance to perform." Participation rather than the musical product seems the key value in the informal music setting (Grandin, 2010). According to Rice, Nepali music is "learned but not taught" (2003: 65).

During my first field trip in February 2012, I observed several wedding bands. The younger members participate without having rehearsed the music beforehand (video 1). By listening to the music and closely observing gestures and movements of older members, younger band members gradually master the music. Analysing the immersion process in local music suggests that observation and audible learning are essential to musical learning.

Video 1: Observation of older members

To summarize, all respondents refer to Nepali traditional music as something that formed their musical identity. The absorption process tuned their ear toward Nepali musical traits. During the immersion process they actively engaged in local music, their involvement varying from voluntarily playing the *bansuri* to mandatorily playing the *madal* during festivals or family gatherings. Consequently, learning tools such as observation and audible learning form the base of learning unfamiliar musics. This endeavor is, however, not without constraints, especially in relation to music from the West.

Constraints and Possibilities: Learning from Gatekeepers

As Western popular music becomes more widely available in Kathmandu, from the arrival of the hippies in the 1960s (Greene & Henderson, 2000) to the current emerging of Western curriculum–based music institutes such as KJC [6], NMC [7], and School of Performing Arts Kathmandu[8], Nepali youth attempt to add various musics to their repertoire. During their period of adolescence, rock music from Nirvana to AC/DC seems to dominate their personal hits chart: "The first song was an AC/DC song, 'Big Gun,' and I had that CD, and I played it while I shower[ed]. That interested me the most," Mahesh, a guitarist, explains. Consequently, Nepali traditional music becomes less dominant in the absorption and immersion process. Nepali popular music itself is heavily influenced by Western pop and rock music, resulting in an eclectic mix heard by youngsters in clubs, music bars, music festivals (Greene, 2001; Shrestha, 2012), and music schools. However, jazz and rock are usually taught only in certain schools that are the preserve of the elite and higher middle class but specific knowledge on music styles and knowledgeable teachers are not always available.

In general, music study is frowned upon in my respondents' community, who note that there are three constraints for fully participating in music learning. First, music is seen as enjoyment and for passing time: "Besides that, it is useless," says Rakesh of the NMC Jazz combo. Hence, music education in Nepal is often regarded as an unnecessary luxury. Most middle- and upper-class youth in Kathmandu have access to some sort of music education, whereas those living in the remote areas of Nepal do not. Second, all the respondents in this study report that their families do not support the study of popular and traditional music. Girls especially face exclusion from music education. Motivated and persistent girls, however, find ways to circumvent parents' wishes and secretly attend music classes. According to Rakesh, "Making popular music is not acceptable because of the

[6] www.katjazz.com.np
[7] www.nepalmusiccenter.com
[8] www.spaknepal.com

connotation of drugs." Parents encourage their children to go to college and eventually become doctors or lawyers or enter other professions with high social status (Liechty, 2003). Third, music is not a significant part of the school curriculum, often limited to the daily singing of the Nepali anthem. Kismat, drummer with the KJC Rock combo, says, "Nepali schools don't have the facility to get very good teachers and good education in music. Music here is still ECA [extracurricular activities]; you don't get a degree in music."

Despite this discouragement, eager young musicians explore music. I posit three phases of this exploration. The first is the encouragement phase. In order to obtain knowledge of unfamiliar musics, they seek advice from friends and open-minded family members, who serve as gatekeepers in the quest to explore unfamiliar musics. Musical input and encouragement from gatekeepers prove to be indispensable elements in the musical learning process. In some cases, within the family sphere, adults encourage young children to take music classes or share their collection of blues and rock DVDs. Others are inspired to listen to unfamiliar musics by following the example of older brothers and friends. Music becomes a social thing, something to talk about and actively listen to. During this phase, young musicians have lengthy discussions, for example, about the complexity of jazz and the mystery of improvisation. Such conversations serve as a starting point for the quest for unexplored musics.

The second phase is self-learning or peer learning among friends. Most informants do not have the resources to take music classes at music institutes. In an interview Nihesh explains:

> N: I started learning at home and from the school now.
> I: And at home, who was teaching you?
> N: Oh, with my friends.
> I: Can you explain; how did that work? You came together and then?
> N: When they played chords and they taught me some licks before. When I was starting, when I was 18, one of my friends brought his guitar, and he showed me some licks and played some chords, and I was inspired with him, and I also started to play.
> I: How did he teach you?
> N: Same, by saying this is E chord, and this A minor and C. I looked when he was playing, and I brought another guitar from my friends; another friend and I started to play like him. After a few years, maybe two or three years, I started to learn permanently, with senior brothers, with instructors, and then I came here [music school].

In the third phase, if resources are available, youngsters seek guidance from professional musicians. Complementary to, or apart from, learning from teachers, youngsters consult instruction videos on the Internet. Teachers encourage students to watch instruction videos, the same way they learned their musical skills. They use YouTube videos such as "Jazz Piano Lesson by John Ferrara—3 Harmonization Techniques" (Ferrara, 2012) or the DVD *Rock Discipline* (Petrucci, 2002) to learn new techniques, harmony, and hand and body position and how to play a groove and the end of a song. The Petrucci video is popular with Nepali guitarists who want to learn more advanced material. This groundbreaking educative tutorial video reveals Petrucci's technical secrets in various sections, demonstrating warm-up exercises, scales, and virtuoso solos. The Internet serves as an indispensable source for musical technical information. Through the Internet, youngsters can learn basically everything from the world's best musicians via software. According to my informants, they spend their lives improving their playing and performing with absolute dedication and discipline. Unfortunately, the Internet is not accessible to all Nepali youth, and where it is accessible, loading a YouTube tutorial video is quite time-consuming.

Learning Strategies and Musical Practices

Experiencing unfamiliar musics is essential to the immersion process of musical practices. The first encounter with jazz or rock music is, however, confusing and difficult, which causes some students to quit. Many feel helpless while listening because they lack technical skills, theoretical knowledge, and a general understanding of—and familiarity with—the music. Rishav's first encounter with jazz music exemplifies the difficulty of understanding unfamiliar musics:

> R: When I heard John Coltrane, I thought my god, this guy is crazy; what is he doing? Like I couldn't understand the melody. And like I couldn't take it; I thought stop it!
>
> I: What was so difficult?
>
> R: Because, I don't know what was difficult, but the difficult part was that I couldn't listen to it. Like ooh my god, John Coltrane. When I listened to John Coltrane for the first time, they were just playing so many notes. What tune was it? Aah, I can't remember, but it was playing really fast and crazy notes in the saxophone, and the drums were going crazy [sings example], and the bass was like walking so hard like [sings example], and the saxophone was like soloing all over the place, and the piano was also playing.

Despite this perceived chaos, students such as Rishav try to comprehend unfamiliar music. Their first learning strategy is to listen to a single song continually. They listen to Coltrane and AC/DC in the shower, while falling asleep, and during homework. Only then does chaos gradually turn into form and structure for them.

The second learning strategy in the immersion process is the interpretation and imitation of sound. Upon encountering new musics, Nepali youngsters attempt to grasp the music as a whole. Despite being overwhelmed by fast notes and multiple layers in the music, they eventually understand how jazz artists like Charlie Parker and Miles Davis tell a story. In order to understand the content of that story, young musicians may focus on a single instrument. With analytical listening skills they separate all layers and scrutinize every small detail distinctive to that particular instrument. Rishav, for example, concentrates on the bass:

> *"When I was listening to music usually, before practicing, I did not know that music was so deep. I just listen to it, and I just heard the little things that really matter. For example, the bass player doing something like a slide like that [singing the slide]; that really matters where the music is going."*

Youngsters are enchanted by idiosyncratic sounds and try to imitate particularities of each instrument. Additionally, they listen to form. Having listened to a particular song repeatedly, they are able to detect different sections in the music, either by counting bars or signals of individual instruments. Furthermore, they focus on the melody and its structure. Imitation of a specific melody occurs by following the pattern with the eye, then figuring out the kinetic pattern (i.e., where the fingers are going), and finally performing on their own instrument. Analytical listening is conducive to understanding changes in music. These young musicians are now able to detect rhythm changes, modulations, and altered chord progressions. They become aware of the distinctive traits in various musics.

A third learning strategy, after experiencing and interpreting music, is learning the visual aspects of music, including the shape of the chords on the fingerboard, body posture, and hand or arm movements. Kismat explains what musical technical aspects he focuses on:

> K: When I was a kid, I would just focus on how he's playing that, how he's holding his sticks. I basically learned all this from watching YouTube.
>
> I: What are you looking for?
>
> K: How do I grip the stick? How do I play the groove? I closely watch it. I do exactly what the musicians do.

Kismat's answer succinctly summarizes what these young musicians do to learn new musical practices. First, they focus on technical issues, such as how to grip the stick and place the fingers. By watching instructional videos on the Internet, they closely scrutinize how these musicians master their instruments and try to copy their movements. Abhisek uses a systematic method: "I would download an instruction video (*Rock Discipline* by John Petrucci), and he would show how to hold the pick and what string to use. I would deconstruct every little detail; the right-hand technique, how he's moving his left hand." First, the focus is on the shape of the hand and the order of the fingers walking over the strings or the keys. Second, after comprehending the visual aspects of the piece, the student incorporates tempo and timing. During this process, the student looks, listens, and plays along, increasing and decreasing the tempo.

Third, students learn complex chord patterns or melodies first by collecting the correct notes through listening and by watching visual examples. Sometimes concurrent with rote learning, the student learns notation, chord symbols, or tabs, which play a minor yet important role. Some students transcribe melodies in staff notation, concentrating on rhythm changes and determining the value of each single note. The majority, however, use visual and audible learning in combination with guitar tabs or chord symbols in their daily practice routine to acquire technical musical skills.

Theoretical Knowledge

This brings us to the importance of music theory in intermusical learning processes. During my fieldwork I had several requests to give a guest workshop in the music schools of this study. Enthusiastically, I proposed to give a band class or an improvisation workshop. The students, surprisingly, responded: "We would like to have a theory class from you." To put it mildly, I was surprised by their request. I reacted: "A theory class? You mean staff notation, chord progressions, sight reading, scales, and boring polyrhythmic exercises?" In retrospect, I now understand this "surprising" request. Improvising a solo over a chord progression is one thing, but making a musical decision and recognizing it as a theoretical decision during musicking empowers young musicians and brings them a step further in the musical learning process.

During the immersion process, students develop a relationship with notation and theory in general. On the one hand, they are able to replicate pieces based on audible information, without using any form of notation. On the other hand, they actively try to enhance this learning style by gaining theoretical knowledge. Recognizing a lack of theoretical knowledge seems to be a shared narrative. For students who are able to play music but do not know what they are playing and have the desire to go beyond mere replication, music theory proves to be pivotal to gain skills in and

understanding of unfamiliar musics. But in order to gain theoretical knowledge, these students must develop a series of skills.

I studied how my informants incorporate theoretical knowledge in their daily practice. When copying shapes of chords no longer suffices, serious students turn their attention to sudden changes in patterns. First, they tend to listen to the basics of a song by focusing on the basic chords and dominant rhythm. Then they try to distill essential information on sudden changes in the music. They focus on altered chords, harmonic changes (for example, in the bridge or in a modulation), and sudden rhythmic shifts.

They also give attention to melodic contour. According to my informants, making a transcription of a song is the most effective way to gain full understanding of melodic development. They listen to a song analytically, usually beginning with the bass line, and notate the line. Most students, like Mahesh, try to figure out the key by using the guitar as reference: "I take my guitar, find the first note and then the second note." After transcribing a melody and analysing it, they strive to incorporate this theoretical knowledge in their improvisations. Drawing on theory classes and this actively practiced new knowledge, serious students not only observe and imitate but are able to comprehend chord progressions and know which notes fit a certain scale for improvisations. As Subash puts it, "Before I came here, I only played songs. I did not know that there were scales and improvisation. But when I came here, I knew about scales. I did not know that music had theory, but when I came here, I know that music has scales and other musical things."

Since youngsters in Kathmandu immerse themselves in musical and performance practices predominantly through observation and imitation, the introduction of theoretical knowledge does not change this deeply rooted process of learning. However, those with an advanced level of theoretical knowledge do rely to a lesser extent on observation and imitation. Students advanced in music theory rely increasingly on their knowledge of scales, form, and the logic of chord progressions, but this does not mean that observation and imitation disappear. On the contrary, these advanced students keep learning from friends, YouTube tutorial videos, and teachers through observation and imitation. During one band practice I saw an advanced student struggling with notation. He knew how to read staff notation but was clearly not satisfied with this way of working. He preferred to observe the teacher, who sang the melody accompanied with gestures depicting the rhythmic structure. The student focused on the gestures and the audible information instead of the staff notation in front of him (video 2). In spite of his dissatisfaction, Kismat acknowledges the importance of theoretical knowledge: "I was like I wanna learn that fast. I don't wanna go the hard way. Yeah, inside I think I should do that, and I am trying to do these days. It is very important to be able to sight-read."

Video 2: Theoretical knowledge

Access to theory is not universal. Students with minimum or basic theoretical knowledge continue to rely solely on observation and imitation. During the immersion process in musical practices, they scrutinize technical musical aspects without fully understanding the theoretical background. However, they perform this knowledge on an intuitive level: "Basically we don't play from theory but from ear, by just listening," Rakesh states. They are able to perform a wide range of musics by means of observing and imitating professional musicians. Nonetheless, as stated by beginners in music theory, they lack full understanding and reflection on musical decisions. Despite a proficient level of performing, the lack of theoretical knowledge impedes full acquisition of unfamiliar musics.

Blending Learning Strategies

I posit three degrees of intermusical learning. The process of blending learning strategies is central to the first degree. I analyze how Nepali youngsters create different intermusical learning strategies based on three degrees of proficiency to reflect on musical decisions and grasp unfamiliar music. I use three examples in which youngsters transfer particular local learning strategies into unfamiliar musics, creating a new learning experience. The first video example shows how Rohit, a young Nepali composer with little theoretical knowledge, blends Nepali musical traits with Western popular music. The second demonstrates how members of a fusion band combine Nepali/Indian classical music with jazz chords. The third demonstrates how young musicians reflect on style-specific traits in unfamiliar music.

Rohit composed a ballad while sitting in his room during the many dark hours in Kathmandu during load shedding (scheduled electric power cuts). The song, "Bistarai," has a distinctive Nepali folk melody, with lots of repetition and a pentatonic feel. The verse is based on an I-V-I chord progression accompanied by guitar, bass, and tabla. Rohit claims that he does not know how he came up with the musical material: "I was plucking and playing, and it just came. I loved the intro sound that I got from random plucking and kept it as the main theme plucking for the song."

As can be inferred from the musical material of the melody and the use of tabla in this song, Rohit is immersed in local music. Subsequently, he has only basic knowledge of harmonics in unfamiliar musics. He knows that the chord in the verse is an “E major—something” (in reality an E+9). He is capable of combining the Nepali melody with an altered chord, creating a distinctive Nepali popular music sound. During the composition process he invites his friend, a tabla player, to play along. Just before the second verse the tabla plays a fill and accompanies the rest of the song, emphasizing the Nepali sound. Rohit replaces the usual drum accompaniment with specific Nepali musical traits.

Incorporating specific traits from one music to another might incorrectly suggest that intermusicality in this case refers to the musical product as such. Intermusicality, however, is a learning process, something youngsters actively do. Despite Rohit’s limited theoretical knowledge, he is able to transfer Nepali musical traits to unfamiliar musics. He composed the song by “random plucking.” Random trial and error represents musicking at a predominantly intuitive level; its stages were discussed earlier (video).

Video 3: Rohit John Chettri : Bistarai

In the second example, five young musicians from the Eastern and Western Department of NMC practice together for the first time. Their assignment for the day is to combine Nepali/Indian classical music with jazz and perform this onstage within two hours. After individual improvisation for 10 minutes, the guitarist demonstrates a repetitive motive. The bass player observes him and tries to imitate the motive. While the bass player practices individually, the flute player attempts to improvise another melodic motive that fits the repetitive guitar motive. The melody is, however, too extended and conflicts with the repetitive motive. The teacher intervenes by introducing theoretical observations regarding a melodic motive. While depicting a motive with his hand, he explains: “A motive is a collection of a few notes, the building block of a musical piece. It needs to be recognizable.” After observation and imitation, theory serves as a reflective tool; it makes the students understand what they are doing. After the flutist practices his five-note ascending scale motive by playing it repeatedly, he tries to combine his motive with the guitar. The guitarist corrects

the flutist by singing the right rhythm and verbally as well as nonverbally clearly pinpoints the location of the first beat. They repeatedly play this motive as call-and-response transmission until it is mastered. During this stage, band members largely rely on observation and imitation by means of call-and-response transmission.

Further along in the process, when the band members reflect on errors in their playing using theory as a learning tool, intermusical learning is introduced. During this stage, the guitarist demonstrates two important intermusical traits. First, he finds the chords while playing together with the flutist in an improvising manner. Improvisation is central to the musical immersion process of young musicians in Kathmandu. Rooted in their local musical tradition, youngsters learn new skills in unfamiliar musics through trial and error. During that process they are fully dependent on observation and imitation of peers. In video 4 the guitarist improvises new chords on the spot, transferring local learning strategies into unfamiliar musics (video 4). Due to his theoretical knowledge, the guitarist is aware of the harmonic possibilities of the flute motive, enabling him to reflect on his musical decisions. During this reflection process, he decides whether a certain chord fits the melody. The guitarist listens to the flute melody and improvises chords, seemingly effortlessly, as an accompaniment under the flute motive. He plays a chord progression with altered chords in a *jazzy* style. He uses what he refers to as “flavor chords” to accompany the pentatonic folk melody of the flute, demonstrating his musical skills in both jazz and Nepali folk music. Subsequently, he is equipped to transfer knowledge of both musics into a new composition.

Video 4: Reflection

Reflection on musical decisions and transfer of theoretical knowledge into a new framework are key to the second degree of intermusicality. In contrast to the first degree, music theory fulfills an active role during the music-making process. During this central stage of the learning process, the guitarist clearly demonstrates that he no longer copies novel musical material but incorporates his skills and musical knowledge into a new framework.

Increasingly, youngsters in Kathmandu rebel against disempowering political structures. They openly voice their discontent with corrupt political leaders by invoking a recognizable reggae sound.

In the song “Neta Ji” (Political leaders) the artists display an immersion in unfamiliar musics. Of particular interest, this final example demonstrates that they are capable of adequately performing the specific style traits of reggae while recognizing the subtle difference between specific sonic features of reggae and Nepali popular music. Kismat, drummer, elaborates: “We try and incorporate reggae music into Nepali [music], but you can very easily hear the authentic reggae sound regardless. At times it can even be like just the lyrics are Nepali. Since we essentially play reggae music, we try and be true to the genre. We are still working for our own sound.” Besides remaining true to the genre, the band is able to musically articulate how reggae should be performed and how it differs from their own Nepali sound. Recognizing style-specific traits of unfamiliar musics is an essential part of intermusical learning.

Video 5 could give the impression that the band members merely copy reggae music. Kismat strongly disagrees and demonstrates his knowledge of the subtle differences between various popular musics:

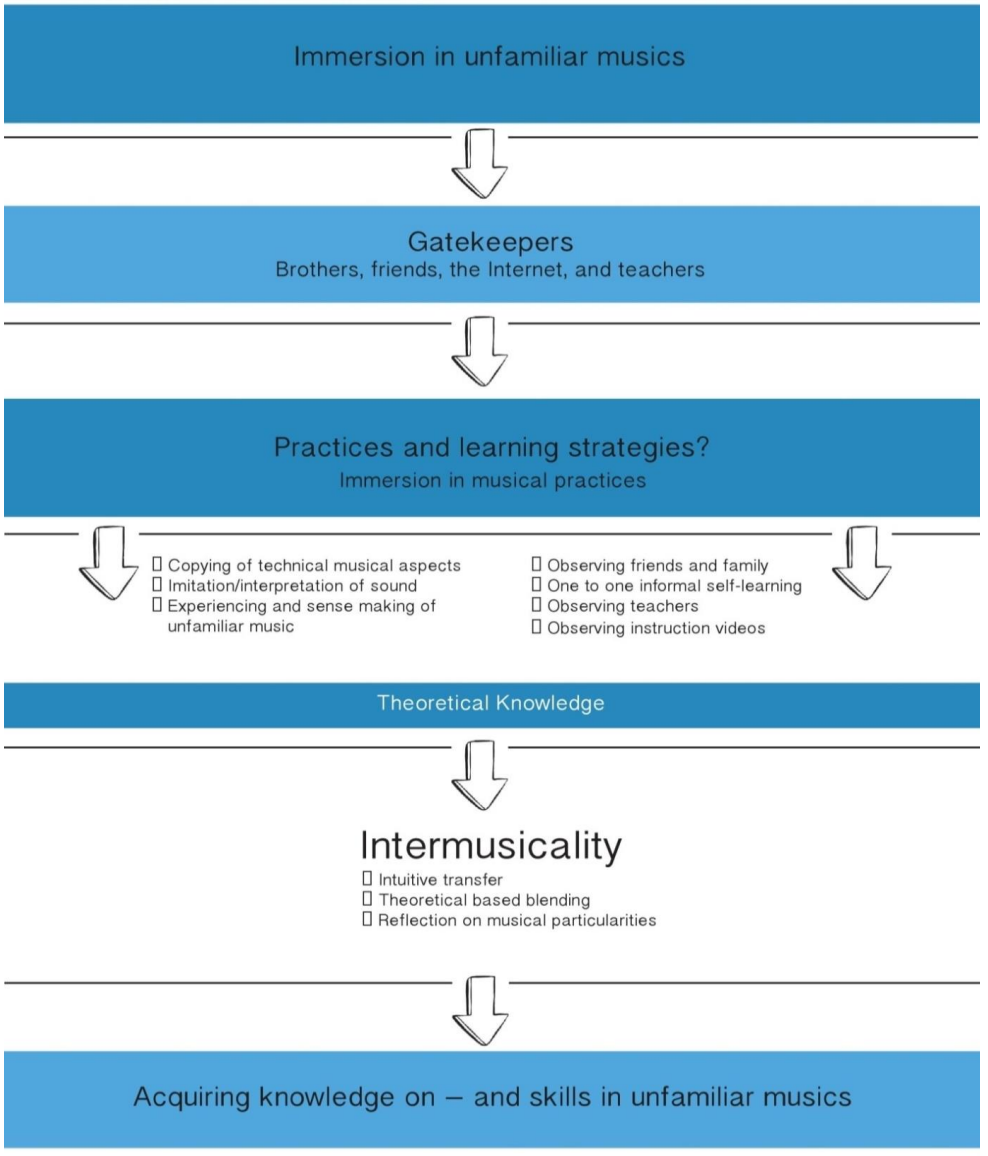
> *“I wouldn’t like to use the word copied. I would rather say incorporated the musical traits from reggae than copied. We just play reggae music and add our own ingredients and tastes. It’s like 1974 AD [famous Nepali rock band] playing “Nepali Ho,” if you know what I mean. We can’t say they copied rock music, but it would be safe to say they integrated that sort of music into Nepali-styled music. All these genres of music are actually open I think, but there is some specific sound or beats that make it authentic. We try and keep that in mind.”*

This form of reflection demonstrates that the band members are aware of the particularities of various musical systems. It bears remarking that at this degree of intermusicality, listening skills have not been replaced by staff notation and visual, rote learning is still favored. However, students capable of blending musical learning strategies prove to be more proficient in reflecting on musical detail. This skill enables them to use these musical details in any framework, eventually creating their own music.

Video 5: Joint Family International – Neta Ji

The above observations can be brought together in a schematic overview. I have discussed how youngsters acquire knowledge of—and skills in—unfamiliar musics. I have identified who the gatekeepers are, which learning strategies youngsters utilize, and how they blend various learning strategies into three degrees of intermusical learning to acquire knowledge and skills in unfamiliar musics. Intermusicality means intuitively transferring limited theoretical knowledge from already existing local musical knowledge into a creative incorporation of musical particularities of other styles. Furthermore, intermusical learning entails more than mere copying of novel musical material. It brings about skills and knowledge to be applied into a new framework, using observation, imitation, improvisation, and theory into a blended learning experience. Finally, reflecting on musical traits of various musical styles helps provide a fuller understanding of unfamiliar musics (model 1).

Model 1: immersion process in unfamiliar musics



Conclusion: The Essence of Intermusicality

Theorists of globalization argue that the world is no longer divided into culturally homogeneous entities. Musics of the world travel from place to place in a constant process of negotiation, fusing into hybrid musical objects (Appadurai, 1996; Bennett, Shank & Toynbee, 2006; Born, 2000). In this "transformative zone" (Russell, 2006: 175), "the partial culture," actors are in a state of "in-betweenness" (Bhabha, 1996: 54), negotiating between various musics. These processes of negotiating need further elucidation and theoretical refinement. This study demonstrates that the mixing of musical styles involves blending modes of appropriation or the merging of learning strategies and skills. It seems that, for teenagers in Kathmandu, local music holds a prominent place in their soundscape; it is ingrained in their musical bodies (Demorest & Morrison, 2008; Krumhansl, 2000; 2003; Krumhansl & Toiviainen, 2001; Schellenberg & Trehub, 1999). As popular music plays a major role in youth culture, and increasingly so in developing countries (Greene, 2001), youngsters overcome various constraints and actively explore musical practices of unfamiliar musics using a lens of familiar Nepali music by blending learning strategies.

Nepali youths tap into local music-learning strategies. They utilize those techniques in the immersion process of unfamiliar musics, crosscutting both music systems. Some students as a direct result of greater theoretical knowledge rely less on observation and imitation, for example, to solve a mystery chord in a chord progression. However, observation and aural learning do not disappear. These deeply rooted learning tools became inextricably connected with learning musics in general.

Observation, imitation, and gaining theoretical knowledge alone do not necessarily lead to mastering unfamiliar musics. Central to this study is the transfer of learning strategies and the blending process of learning tools from local music into unfamiliar musics. From the analysis of interviews and observations, I developed a model (Figure 6) demonstrating how youngsters utilize knowledge of gatekeepers, the importance of theoretical knowledge, and the blending process of various learning strategies into three degrees of intermusical learning.

My analysis posits three degrees of intermusicality. First, youngsters with little to basic theoretical knowledge are less likely to fully grasp what they are doing. However, using their basic theoretical knowledge, they are able to give meaning to their musical improvisations by naming a few chords or positions. Intuitive as it may seem, these youngsters seek to activate existing theoretical knowledge by consulting the Internet, teachers, and friends. Additionally, incorporating this knowledge with specific Nepali musical traits, transferring them into unfamiliar musics, and knowing intuitively when and how to use them are crucial requirements of this degree of intermusicality.

Second, rooted in local learning strategies, young people tend to improvise chords on the spot by audible learning. When they start blending learning strategies by using a local learning strategy such as audible learning and reflecting on errors and musical decisions, intermusical learning is introduced. Because of their theoretical knowledge, youngsters understand the ramifications of harmonic decisions. Generally, they deploy music theory as complementary to visual and audible learning, progressing from intuitive playing to an increased understanding of their musical decisions.

The third intermusical degree involves reflection on features of unfamiliar musics. Young musicians who are able to articulate features in various musics demonstrate a fuller understanding of musical traits. Moreover, they display cognizance of their own musical learning strategies. These youngsters are able to analyze style-specific sounds, copy these sounds, and, more important, reflect on their musical decisions.

This research presents two core findings. This chapter focuses on globalization and hybridization theories, demonstrating that the acquisition of hybridized and unfamiliar musics does not come automatically with globalization. Current theories assume that due to transnational flows, musics and musical practices cross-fertilize and fuse into novel hybrid forms (Frith, 2000; Russell, 2006; Stokes, 2004). On a micro-level, however, the acquisition of unfamiliar musics requires agency and involves endless experimentation and learning by trial and error. In addition, young Nepali musicians must overcome both social constraints and various musical challenges before they can actively involve themselves in learning new music styles. In addition, mastering unfamiliar musics requires active immersion, support by gatekeepers, observation and imitation of musical practices, theoretical knowledge, and intermusicality.

Research shows that infants easily detect differences between their own cultural-specific tonal structure and other musics, but as soon as children mature and become immersed in the music of their own culture, their ability to detect nuances in other musics decreases (Dowling, 1999; Honing, 2009; Trehub & Hannon, 2006). These studies support my own findings in Kathmandu. The band members unanimously acknowledge that they struggled to acquire knowledge and technical skills in jazz and rock music. But absorption and immersion in local music and their difficulties in detecting nuances in unfamiliar musics did not prevent them from mastering the new musical system. On the contrary, young musicians in Kathmandu demonstrate that, with perseverance and dedication, intermusicality provides the key to mastering unfamiliar musics.

Intermusical learning reinforces important implications for music education in general: Youngsters do not learn musics through a distinct set of separate musicalities but acquire different music styles through a blended set of learning strategies (O'Flynn, 2005). Understanding these blended learning strategies contributes to a musical learning environment where teachers, instead of

deploying a fixed method of musical learning, employ blended, intermusical methods of learning to improve the learning process.

Chapter 3

Learning with the body:
investigating the link between musical interaction and the acquisition of musical knowledge and skills

Learning with the body: investigating the link between musical interaction and the acquisition of musical knowledge and skills[9]

Introduction

Despite empirical evidence claiming that bodily processes underlie our cognitive decision making and social functioning (Yang & Damasio, 2007), the role of the body in learning processes seems largely ignored in education (Armour, 2006 ; Chodakowski & Egan, 2008; Powell, 2007; Reid, 1996; Evans & Davies; 1996). Admittedly, scholars in physical and arts education do acknowledge the role of the body in learning (Bowman & Powell, 2007; Duncum & Springgay, 2007; Green, 2007; Osmond, 2007). However, the pervasive body-mind dualism, referred to as the Cartesian split (Crossley, 1995; Howson & Inglis, 2001; Merleau-Ponty, 1962), is deeply rooted in the field of education. Consequently, the body becomes a "vague sensorium", which merely transmits data to the mind for processing; making the body subordinate to the mind (Bowman, 2004).

Throughout collective musical learning process, musicians at various levels of proficiency often transmit musical information through modelling, gaze, gestures, bodily movements, and motion (Barrett, 2005; Bowman 2004; Davidson, 2005; Rogoff, 2003). From a very young age onwards, children absorb musical information, thus familiarizing themselves with culturally specific musical parameters by means of interaction with adults and peers (Campbell, 2001; Dissanayake, 2000; Green 2008; 2011; Rice, 2001). Research on musical learning demonstrates that children prefer non-verbal modes of communication. They depend on participation in "music in action" (Barrett, 2005) through bodily interaction with others. The participation in non-verbal communicative practices is pivotal to the on-going development of musical learning. In this connection I should emphasize that the familiarization process through observation or listening is by no means passive. Comprehension of music almost always involves motor imagery. In other words, thinking about or observing a musical activity involves the imagination of the musical performance itself (Cox 2011). Consequently, the body is inextricably rooted in musical learning.

Little is known, however, about *how* musicians use their body when acquiring music that is unfamiliar to them. In the second chapter of this dissertation, I investigated how young Nepali musicians who grew up with one prominent traditional local musical system, acquire knowledge and

[9] This chapter is an extended version of a book chapter in press: Van den Dool, J. (2017). Learning with the body: Investigating the link between musical interaction and the acquisition of musical knowledge and skills. In B.W. Leung (Ed.), Traditional musics in the modern world: Identity, transmission, evolution, and challenges (pp. XX). Dordrecht, The Netherlands: Springer

musical skills in unfamiliar music later in life through intermusical blended modes of appropriation in which bodily information of peers played an essential role. In this context, unfamiliar music, refers to the musical learning process of jazz, rock, and popular music, as opposed to learning familiar local traditional music. In terms of sound, music theory, technical aspects, and performance practices, acquisition of unfamiliar music requires musical training. Music education, however, in this unfamiliar system is often less accessible for those who can't afford it. Conversely, the latter, local traditional system, dominates the daily soundscape, rendering familiarization through frequent exposure. The tools young musicians have at their disposal to acquire knowledge on music that is unfamiliar to them are explored by focusing on bodily learning strategies and practices of music making (Van den Dool, 2016).

This chapter specifically investigates the role of the body in musical learning processes by studying the relationship between bodily involvement in musical learning processes such as musical interaction, gestures, entrainment and the acquisition of musical knowledge and skills. Based on a case study carried out in Kathmandu, Nepal, I strive to map the embodied and often unconscious nature of musical interaction between music students. During this process, musicians' interaction can be analysed by means of motor schemas and representations of bodily movements, such as gestures and musical interaction, which serve as building blocks for embodied musical learning processes (Clayton, 2008). I borrow the notion of Clayton that musicians have an implicit understanding of patterns of bodily movements during the music making process. This understanding, referred to as entrainment, enables them to not only communicate somatic and emotional states, creating meaning for the listener (Clayton, 2008), but also to learn how to acquire new musical material.

For this study I selected 5 bands from music schools in Kathmandu valley. After systematically analysing the video recordings of the band rehearsals, I coded the videos in a qualitative analysis tool, *Transana Professional 2.60* (Woods, 2009) and exported the results to SPSS for quantitative analysis. The findings of the video-analysis of this case study allow me to demonstrate that musical knowledge is enhanced and communicated through bodily interaction between the band members. There seems to be a link between forms of musical interaction, gestures, entrainment, and the acquisition of musical knowledge and skills, such as rhythmic patterns, cohesion, form, melody, theory, chords and harmony. This research demonstrates how Nepali music students address the modern world with embodied learning strategies. Understanding the link between bodily interaction and musical knowledge and skills is conducive to embodied music education and caters to the embodied learning strategies of students.

Theoretical background*: The minded body*

While dancing in a club, playing the piano, or sitting in the audience during a jazz concert, the body is inevitably drawn into the music. Both musicians and participatory listeners respond to music with a range of bodily movements including tapping, facial expressions, and gestures. The body seems inextricably connected to the practice of music making and listening. We let ourselves be drawn into the music because music is not about structure, but mostly about process. Music is only partly built of logic, abstract meaning, and reason. In fact, music is predominantly about "motions, dance, global and contradictory feelings" (Keil, 1995:1). Besides bodily responses to music, there is also a practical component; musicians need their body to produce sound. In short, without the body there is no music.

Bodily involvement in musical learning and musical activities has been disregarded by many scholars. According to Bowman and Powell (2007), this suspicion towards the body has a long history. At the base of this suspicion lies the crucial dichotomy between body and mind. This division, a paradigm of Western intellectual history, has led to the ambiguous argument that emphasizing sensory awareness induces diminution of cognitive activities (Howes, 2005). The classic division between body and mind, in somatic studies referred to as the Cartesian body-mind dualism, is derived from theories of the philosopher Descartes (Crossley, 1995; Howson & Inglis, 2001; Merleau-Ponty, 1962). Although he argued that the mind and body are not entirely distinct entities, but rather interact in an inseparable union (Shapiro, 2007), the body and the senses were perceived as potentially deceiving the mind. The narrative of thinkers such as Descartes, and later Kant, existed in separating the mind from the body as a prerequisite for knowledge acquisition. Only when the mind is freed from bodily limitations and restrictions, the mind can truly harvest knowledge (Anderson, 2003; Farr, 2012). Despite the proliferation of somatic studies in modern science, the Cartesian split has been deeply rooted in contemporary intellectual debates (Howes, 2005).

Since the Enlightenment, science has perceived culture as something "superorganic". "It refers to a self-contained world of unique qualities and manners divorced from the world of materiality and biology. Culture has thus served as a token to demarcate, separate, exclude and deny" (Jackson, 1986: 328). A persistent theme within this ontology is the denial of the somatic. Consequently, bodily praxis has been regarded as subordinate to verbal praxis. The body-mind dichotomy "detaches the knowing and speaking subject from the unknowing inert body" (Jackson: 329). The body serves merely as a medium to communicate or express ideas. It becomes a shell, a static and passive subject, in which ideas are embodied and social values are projected (Ibid.).

In the endeavour to establish sociology as a discipline, aiming at explaining social phenomena within the conceptual apparatus of "social physics" and "social facts", classic sociologists like

Durkheim, Comte, and Simmel steered away from explicitly attributing importance to embodiment in social interaction. It was not until the 1980s that the body acquired more significance in sociology. This rise of interest was largely due to the analysis of consumer culture centralizing actors' sense of identity, changing ecological life styles, and second wave feminism disputing the so-called natural subordination of women's corporeality (ibid.). In pursuit of corporealising sociology, many scholars moved away from the theoretical framework which objectifies and subordinates the body within social structures towards the body as the base of experience (Howes & Inglis, 2001). In recent years, scholars such as Turner (1984), Shilling, (1993), and Crossley (1995) have been setting the sociological agenda towards "theorizing the body", to show the neglect and the "absent presence" of the body in sociology, and the "importance of the body in establishing society" (Howson & Inglis, 2001). Their work is heavily influenced by the frontrunner of phenomenological philosophy, Merleau-Ponty. Central to his theory is the convergence of the dualistic divide of pure minds and bodies into "body-subjects" (1996). Body and mind are "wholly intertwined and indissociable", constantly acting within the social world, shaped, but not determined by social structures (Howson & Inglis, 2001). Building upon this theory, Bourdieu (1992) overcomes the structure/agency dualism by arguing that the body-subject is acted upon within a habitus formed by social structural patterns. In turn, the body-subject is not merely subordinated to structural aspects of the social world, but it possesses a set of tools to reproduce and constitute social structures. Whether the body-subject is predominantly agent or more determined by social structures (Crossley, 1995) is far beyond the scope of this research. The fact that the body is no longer subjugated to the mind, but touches and is touched upon, listens and is listened to, sees and is gazed upon, forms the ontological framework of my research.

Empirical evidence to support the theory of the unity between body and mind comes from neurobiology. Already in the 19th century, William James was convinced that the body and the brain were connected through nerve pathways. Over the years, this conjecture has been developed and refined. It demonstrates that the body does not operate as one single entity, connected with wires to the brain, but rather consists of numerous compartments each wired with their own unique nerve pathways and chemical channels (Damasio & Damasio, 2006). Recent evidence in neuroscience shows clear connections between cognitive mechanisms and emotion. It reveals that our cognitive decision making and social functioning is underpinned by hidden emotional, thus bodily, processes. In modern biology, humans are not a mere lump of flesh connected to the brain, but "fundamentally emotional and social creatures" (Yang & Damasio, 2007: 3).

In contrast, education often ignores the link between high-order cognitive skills and the emotional body by approaching students as disembodied brains, making the body elusive in educational theories (Armour, 1999; Chodakowski & Egan, 2008; Powell, 2007; Reid, 1996; Evans & Davies, 1996). Up until the 1980s, teachers tended to impose their cognitive knowledge on the

subservient body. In this top-down approach, the critical role of emotion in cognitive learning processes and governing social behaviour was overlooked (Damasio, 1994). Despite the growing written accounts on embodied learning in arts education (Bowman & Powell, 2007; Duncum & Springgay, 2007; Green, 2007; Osmond, 2007), and recent educational changes recognizing emotions having a basis in the brain (Yang & Damasio, 2007), teachers often cease to view students as embodied learners (Powell, 2007). However, trying to overcome the body and mind dualism could have a revolutionizing effect on the role of emotion (the body) in education. Acknowledging the pivotal role of emotion in cognitive processes such as decision making helps students transfer previously acquired knowledge into real life situations. Conversely, transmitting knowledge within the rational domain and minimizing the crucial role of the body in cognitive processes may be a hindrance to the transfer of knowledge into real-world situations (Yang & Damasio, 2007). To exemplify this, teachers should not only teach students to decode text into audible sounds. This laborious endeavour "does not strongly activate appropriate perceptual symbols", but risks to become "an exercise in naming ungrounded, and hence meaningless, symbols" (Glenberg, 2008: 360). In contrast, Glenberg argues that students should be encouraged to experience and embody grammatical constructions, words, and phrases into real life events, "thereby grounding the symbols and imbuing them with meaning" (Ibid.). In the light of music education, it stands to reason that capitalizing on the embodied nature of musical learning leads to successful acquisition of musical tasks.

The persistent ontology of making the body subordinate to the mind and, equally noteworthy, the "implicit separation of the corporeal from the cognitive" (Bowman, 2004) has far-reaching implications for music education. The corporeality of music making is seen as not more than a means to perform. Essential to musical learning is the process of tuning the disembodied mind towards the formal and syntactical properties of music. This entails listening to music's so called aesthetic qualities including dynamics, texture, melody, harmony, and timbre (Elliott, 1995). This listening mode echoes classical aesthetic theory, leading Immanuel Kant to the conviction that music "appealed too much to the body and too little to the higher culture of mind" (Kant, 1952 in: Bowman, 2004: 3). Echoing Kant, Friedrich Schiller advocates "aesthetic education" that would warm the mind to beauty; but of equal importance was that it brings formal discipline to sensual indulgence (Bowman, 2004: 3). The classic aesthetic theory persistently pushes the body out of the realm of musical activities "and gravitates toward experience that is abstract, mindful, cognitively distinguished, and trustworthy" (Ibid.: 3).

Ignoring the body as an equal player in musical activities is the same as ignoring the irreplaceable role of the hands in the practice of playing piano. The challenge is to break free from the Cartesian split by acknowledging the unity of body and mind. This endeavour should not only

lead to strategies that establish mind – body interaction, but fuse the two entities into one. Bowman argues that we need to develop new theories that grant the necessity of "bodily-constituted knowledge" (Ibid.: 8) in which music is an embodied experience. In contrast to auditory-based cognition, embodied cognition includes the "whole human body as mediator between mental processes and physical energy" (Leman & Camurri, 2006: 209). For Bowman, however, embodied accounts entail more than the body as a mediator. He argues: "embodied accounts construe mind as an activity emergent from, structured by, and never wholly separable from the material facts of bodily experience" (Bowman, 2004: 10). This ontology entails two important implications: 1) the body is in the mind, united with a vast network of neural pathways. Hence, cognitive processes are grounded in patterns of action, resulting from "perceptuomotor capacities and achievements that are part of bodily hardware, whether innate or acquired" (Ibid.: 12). 2) These capacities are "embedded in and constituted by their biological, psychological, and sociocultural contexts" (Thompson, 1996: 128). Besides biological and material aspects, the body is influenced by social and cultural practices and shaped by its daily actions (Butler, 1993). Consequently, in the words of Bowman (2004: 25): "…knowing is inseparable from action: knowing is doing, and always bears the body's imprint." With this "minded body" (Ibid.: 27) musicians participate in performances with their whole body. They feel musical parameters in their muscles as the brain processes them. The minded body therefore forms an inseparable unity.

By no means does the foregoing implicate that learning always requires a moving and active body. This assumption could inevitably reinforce the pervasive doctrine that during observation and listening processes the body is turned off and subordinate to the brain. The ontological basis of this study rests on the conviction that seemingly purely cognitive activities such as observation are deeply rooted in the human body. This claim is based on a vast array of literature, generally accepting the theory that the human brain is capable of simulating movements when an action is observed with mirror neurons (Cook et al., 2014; Calvo-Merino et al., 2005; Fadiga et al., 1995; di Pellegrino et al, 1992; Jeannerod, 1994). It all started 2 decades ago, when researchers recorded mirror neurons discharging in the premotor and parietal cortices of macaque monkeys during action observation as well as during execution (di Pellegrino et al, 1992). Humans possess a similar mirror system with which we are able to observe particular muscle movements and translate the neural codes for observation to the actual execution for those same group of muscles (Fadiga et al., 1995). Interestingly, our mirror system seems to be more sensitive to observing earlier acquired motor repertoire. As suggested in an interesting study on acquired motor skills with expert dancers, our brain simulates the action we observe based on the level of familiarity. The higher the familiarity, the more activation of motor areas preparing for the execution of an action were observed. In general, our mirror system connects freshly acquired motor repertoire with already existing motor repertoire

of the observer (Buccino et al, 2004). The specific motor representation for the observed action is referred to as human action observation (Calvo-Merino et al., 2005). Recent evidence shows that mirror neurons are present in the human brain (Kilner & Lemon, 2013), but the functional role of mirror neurons is subject to debate. In contrast to the widespread belief that mirror neurons are part of an evolutional design to effectuate socio-cognitive functioning, Cook et al. (2014) argue that mirror neurons arise in the course of individual development by associate learning processes. Whether mirror neurons discharge as a result of evolutionary and genetic adaptation or/and associative learning remains unsolved (Kilner & Lemon, 2013).

A direct translation to the learning process of music might be somewhat suggestive since there is relatively little evidence on mirror neurons specifically related to music cognition (Cox, 2011). However, as Cox argues, comprehension of music always involves motor imagery. In other words, observing a musical activity comprises the imagination of a real musical exertion. It is as if we can feel a musical phrase or rhythm in our muscles. It is my conviction that music cognition is by nature embodied as it involves motor related areas in the brain. At the same time, the extent to which human action observation in music includes mirror neurons and how this translates into musical actions, deserves a careful consideration and further empirical evidence.

Musicological challenges

I argue that musicology and research in music education could benefit from taking more account of the minded body. The inseparability of mind and body perfectly fits an important mission of music education: the education of expressions and emotions (Bowman, 2004). Unfortunately, music education has sought to find a legitimate place of existence in the dominant cognitive educational paradigm. Theorists from Pythagoras to current researchers of the “Mozart-effect” have sought to highlight the value of music by referring to its cognitive contributions (Bowman, 2007). Subsequently, the outcomes of these studies trickle down to the wider population, sometimes creating false notions that listening to Mozart enhances your IQ (Hetland, 2000; Demorest & Morrison, 2000; Schellenberg, 2003). By claiming certain cognitive, predominantly linguistics based, benefits of music, including critical thinking, problem solving, and deductive reasoning, scholars seem to neglect phenomenally distinctive musical experiences (Ibid.) of listeners and performers alike. The challenge lies in developing theories in which musical experience finds a justified and legitimate place of existence in music education.

Ethnomusicological studies have been characterized by the tendency to write words about words. It is the quintessential undertaking of musicologists to unravel the webs of discursive domains in musical practices. This meta-discursive method does not, however, touch upon the experience of

music (Clayton, 2003). According to Clayton (2007), musicologists should not attempt to fit sonic forms within a paramusical discourse and treat these ideas as a musical text, inevitably neglecting the experience of sonic forms. Conversely, he proposes to listen to music "as interaction and entrainment rather than as structure and symbol" (2007: 136). It is within these interactions with other bodies that we learn how to perform and experience music. Scrutinizing this experience is beneficial for understanding how we learn music. In this study, I therefore seek to retain a prominent place for the minded body and its learning process through musical experiences.

Method

Musicologists and researchers in music education have been investigating children's endeavours in musical learning in a range of settings, including classrooms, informal practice spaces, and laboratories (Blacking, 1967; Campbell, 1998; 2007; Green, 2002; 2008; Leman, 2008). The latter, experimental setting has two main benefits. First, the researcher is able to control confounding factors such as non-topic related conversations, telephone calls, and students walking in and out, inevitably disturbing the flow of musicking. Second, when the human body of a subject is extended with technology in a controlled setting, the researcher is able to access the realm of mental processes and physical entities that could otherwise not be accessed by natural mediators. Interactions between social agents and technology bring about knowledge on how the physical energy of music relates to action-based musical communication (Leman, 2007).

Over the years, some researchers moved their research methods beyond the boundaries of a laboratory experimental setting towards a naturalistic environment (Monson, 1999; 2009; Barrett, 2005). Based on the notion that controlled experimental conditions will inevitably influence humans' natural engagement in musical learning, in this current study I investigated the patterns of bodily movement in a naturalistic environment. Built on socio-cultural theory (Vygotsky, 1986), I view my respondents as social agents who learn music as "a process of socialization into existing systems of meaning and cultural practice" (Barrett, 2005). Observing interactions in a naturalistic learning environment brings about knowledge on the role of the body in musical learning within the context of existing musical practices. In contrast to experimental research, my study focusses on corporeal learning and interaction with other social agents, instead of interaction between man and machine.

Interpretations of musical communication processes are prone to subjectivism. Music making and the formation of meaning of this practice is a highly subjective activity, which makes it difficult for the researcher to discern regularities without introducing arbitrary speculations (Leman, 2007). To address these problems, Thomson (2009) advises to use video analysis in educational settings to analyse and interpret the "production, uses, and interpretation" (8) of learning processes. In light of the "visual turn" in social science disciplines and the explosion of interesting in visual culture (Walker & Chaplin, 1997), I recorded the band practices from various angels, aiming to grasp the bigger picture and zooming into musical particularities. Applied to this research, systematically analysing musical communication (gestures, entrainment, and interaction) between social agents, coding this into categories to discern regularities, and linking these forms of communication with musical parameters, brings about knowledge on musical learning that otherwise would not have been accessible by the researcher. By doing so, the researcher is able to identify various degrees of bodily communication objectively since musical interaction is embodied by the performers (Clayton, 2008).

Musical communication

Musical meanings are evoked when the individual's motor schemes interact with auditory information. We tend to engage with sound stimuli in a constructive and active manner. In the framework of music in the context of human musical interaction we focus our attention to music and the musical bodies of others via entrainment. Entrainment is of specific importance to this research and refers to the process of synchronization in human interaction. Musicians tend to synchronize, or entrain, their rhythms to the sound of others. While doing this we tend to mimic bodily movements and facial expression and share and experience somatic and emotional states of others (Clayton, 2008).

In this study I strive to map the relationship between the embodied and often unconscious nature of musical interaction, gestures, and entrainment and the acquisition of musical knowledge such as rhythmic patterns, cohesion, form, melody, chords/harmony, and theory. During the music making process, musicians' interaction can be analysed by means of motor schemas and representations of bodily movements which serve as building blocks for cognitive musical learning processes (Clayton, 2008). I borrow the notion of Clayton that musicians have an implicit understanding of patterns of bodily movements during the music making process. This understanding, referred to as entrainment, enables them to not only communicate somatic and emotional states, creating meaning for the listener (Ibid.), but also to learn how to acquire new musical material. In current research on musical interaction, gestures and entrainment, the focus is on the analysis of performances (Clayton, 2008; Davidson, 2005). In this study, however, my analysis is altered to and applied for analysis of musical communication and acquisition of musical skills and knowledge. I will analyse three forms of entrainment, six forms of gestures, and four types of musical interaction.

I will first of all focus my analysis on the three forms of entrainment that Clayton (2008) distinguishes. In the context of this study, the distinction between conscious and unconscious entrainment relates to a deliberate action or conscious coordination of the body as opposed to uncoordinated or unconscious movements:

1) *Conscious synchronization*; the musicians consciously identify periodicities in their sound environment and synchronize accordingly with their bodies. Conscious involvement of bodily movements connotes deliberative agency and accounts for awareness of bodily habits;

2) *Unconscious synchronization*; the band members unconsciously synchronize to their own rhythmic patterns and fail to adhere to dominant periodicities (the dominant pulse in the music) in their sound environment. Precisely this lack of bodily awareness becomes the focus of this study;

3) *Stable phase relationship*; the musicians collectively synchronize with identical bodily movements to other musicians' patterns. On the one hand this phenomenon facilitates the experience of being entrained; on the other to actively engage or coordinate the body to the dominant movement of the music.

In addition to the analysis of entrainment, I scrutinize the use of gestures in musical learning processes. In our daily lives, 90 per cent of our communication involves gestures to transmit information to one another (Vaananen & Bohn, 1993). Gestures serve as illustrators in case of hesitation (McNeill, 1992) and even occur when a person is not in visual contact with another. Thus, the use of gestures is conducive to convert thoughts into utterances (McNeill, 1992; Kendon, 1980). The vast amount of literature on gestures comes from communicative studies on speech. Although speech is not the same as making music, there are commonalities in terms of expressive intentions of the sender and effects on the receiver (Davidson, 2005). In speech as well as in music, gestures serve as non-linguistic descriptions, based on movements of the body. These descriptions entail deliberate actions and more spontaneous behavioural responses (Leman, 2008).

Leman (2008) stresses that body movements may deliberately and spontaneously express musical parameters, such as pitch, rhythm, and melodic movement. The body provides a description of moving sonic forms based on "perceptual and sensory-motor mechanisms" (Ibid: 20). Musicians communicate these descriptions to other musicians, aiming at mutual understanding. Since the representational format of gestures "draws on corporeal realizations and their perception of spatiotemporal images rather than propositions", gestures contain limited possibilities to communicate multiple meanings and are less precise in "embodying the viewpoint of an interpretation" (Ibid.). Consequently, a gestural movement might induce confusion on the precise meaning due to its lack of "one to one mapping of form to meaning" (Davidson, 2005: 224). Despite the limited range of movement repertoire, gestures have the potential to communicate various messages, compiled in a single movement. Pointing a finger at a musician struggling to get the correct syncopated rhythm might entail a supportive gesture. It could, however, also mean that the musician is failing and should play that particular note underlined by the pointing gesture. To sum up, the meaning of a gesture depends on the context and mutual understanding between sender and receiver.

For my fieldwork analysis, I draw on theories from Clayton on entrainment and various theories on gestures from linguistics (Rime & Schiaratura, 1991; Bangerter & Louwerse, 2005;

Kendon, 1997), and (cognitive) musicology (Cadoz & wanderley, 2000; Davidson, 2005). I will sum up central gestures from three different disciplines from which I select six key gestures that are of particular interest for my analysis and directly linked to musical learning.

The first gesture, derived from linguistic studies, is consciously produced: 1) *Emblematic gestures* are culturally specific hand movements to express a political idea, such as the American V-for-Victory, or to communicate satisfaction about a well performed solo with the thumbs up gesture (Cassell, 1998). Note that these gestures are highly dependent on the context.

The following three gestures are more spontaneous and unplanned: 2) *Iconic gestures* depict the manner in which a certain action should be executed. These gestures can depict the imagined viewpoint of the narrator. The onlooker or listener infers this specific viewpoint based on the gesture (Ibid.). For example, when a music teacher describes how to pluck the strings, by playing in the air, he takes the perspective of the student. Alternatively, the teacher can sit in front of the student and take the perspective of the onlooker, by pointing at the students' fingers moving up and down the strings. 3) *Metaphoric or pantomimic gestures* do not represent any physical form, but express common metaphors. In the context of this study, when a conductor rolls his open hand repetitively at the end of a musical piece, it demonstrates that the orchestra needs to repeat the piece from the top. 4) *Deictic gestures* locate the physical space around the narrator. Hand movement or pointing fingers contain non-physical aspects, such as holding your right hand in the air while saying: "when you see the treble staff you need to play with your right hand", or referring to a physical aspect by pointing a finger towards a written note or a person.

In addition, I add two other types of gestures to my musical gestures model that are often carried out to refer to the ideational process: 5) *Non-depictive gestures* mark the musical process or structure of a piece (Clayton, 2008). This includes beating a regular pulse, tapping with fingers, and moving the body in accordance to the structure of a rhythmic pattern. 6) *Depictive gestures* illustrate the musical content of playing and singing, analogous to the groove of motion, and the melodic movement. Examples here include the movement of the hand following the melodic contour or the movement of the body to announce a groove.

In the previous chapter, I suggested that observation of bodily movements and interaction with other band members is essential in the music learning process. Knowing how to play a riff is one thing, but knowing how to play that same riff with other band members to create a groove needs hours of observation and imitation of each other's bodily movements. Derived from the analysis of the band practices, I detect four essential forms of interaction during the musical learning process: 1) Monitoring (observing other musicians' movements); 2) Imitation (imitating bodily movements, melodic phrases and rhythmic patterns); 3) Confirmation (confirming well-played phrases, smooth transitions or gestures to express contentment); 4) Correcting (evaluation and correcting of musical

actions). The model of analysis, including four forms of interaction, facilitates a clear overview of musical events within a band rehearsal. The forms of interaction thus, serve as overarching units in which certain types of gestures and entrainment take place.

To substantiate claims on the acquisition of musical knowledge and skills, I analysed specific relations between forms of musical communication (monitoring, imitation, confirmation, correcting, conscious synchronization, unconscious synchronization, stable phase relationship, deictic, depictive, emblematic, non-depictive, iconic, and pantomimic gestures) as independent variables and acquisition of musical knowledge (rhythmic patterns, cohesion, form, melody, chords/harmony, theory) as dependent variables. I employed this set of variables based on the literature as well as my observations during the rehearsals. During the learning process, the students had to overcome specific musical obstacles, captured in the following selection of independent variables: 1) Rhythmic patterns function as the backbone of a popular music piece. Rhythmic patterns consist of collective steady pulse performance, juxtaposed independent rhythms, and of articulation, accent, and note placing at a specific tempo that results in a groove (Middleton, 1993). Failing to perform a steady rhythm on an individual and collective level disrupts the flow and groove of a song. 2) Cohesion represents the simultaneous performance of harmony, scales, and rhythms. These elements can be juxtaposed to one another or articulated together. Cohesion is always constructed through interaction with other musicians (Feld, 1984; Lomax, 1962; McClary, 200; Small, 1998; Winther, 2005). 3) Form is defined as the symmetric structure of a musical piece. The repertoire of the bands in this study consisted of structured A, B, C parts which had to be mastered. 4) Melody represents the top layer of musical texture. It is performed by instruments or vocals on an individual and collective level. The melodies in this study consist of catchy earworms or are, in the case of jazz music, rather lengthy and rhythmically complex. 5) Music theory is taught as a rudimentary base for understanding the musical elements the students play during a rehearsal. 6) Chords and harmony is seen as the interaction between different notes that are played at the same time. In the context of this study, chords are the result of an individual attempt to combine a set of notes, whereas harmony is the result of a collective endeavour to connect the notes together. The mastery of these six musical building blocks proved to be essential elements for a successful performance in jazz and popular music during the band rehearsals.

Selection of bands and data analysis

For this study, I selected five bands from two leading music schools in Kathmandu, *Nepal Music Center* and *Kathmandu Jazz Conservatory*:

- NMC Rock combo: consisting of four music students working under the guidance of a teacher. Their repertoire is a mix between Nepali folk - and popular music and western popular music.
- NMC Jazz combo: consisting of three young musicians, working without the guidance of a teacher. Their repertoire is a mix of jazz and funk music.
- NMC Pop combo consisting of two female singers and three instrumentalists, practicing without the guidance of a teacher. Their repertoire is pop music.
- NMC Fusion combo consisting of five musicians from the *Eastern* and *Western* department of Nepal Music Centre. Their repertoire is a mix of Nepali folk music, Indian classical music, and rock.
- KJC Rock combo: consisting of four music students, alternately working with and without the guidance of a teacher. Their repertoire is western rock, jazz, and pop music.

The results of this study are based on data collected from 20 band rehearsals and 5 informal practices, with a total amount of 14 hours of video data. For this analysis, I selected 12 rehearsal recordings based on formation consistency of band members and teachers. Too much variation and change in participating students could affect the validity of the analysis. Video recordings with unchanging band members met the criteria of consistency and were compiled for analysis. The selected clips varied from 5 to 55 minutes, with a total amount of 4 hours and 15 minutes.

First, I systematically coded the 12 video recordings using *Transana Professional 2.60* (Woods, 2009). This qualitative software program allowed me to indicate the analytical significance of my data segments through coding each form of musical interaction, musical knowledge and skills. Practically, I watched each rehearsal in the *Transana* interface, manually inserting and coding each gesture, musical interaction, entrainment and musical skills acquisition. This resulted in a fine-grained graphical report of keyword sequence maps, showing the specific patterns of entrainment, gestures and interaction in relation to musical knowledge and skills during the process of musical learning on a time line. In addition, *Transana* also provides episode reports, based on the written transcript of the analysis. The analysis resulted in 513 clips, determined by various occurring events such as failure of acquisition, gestures, entrainment, and acquisition of musical knowledge. A clip can capture one occurrence of an event such as an isolated gesture that does not necessarily lead to

anything, or a series of events that lead to the acquisition of musical knowledge. Each of the clips comes with a report that consists of the specific transcript related to that clip. Besides this, the report shows the forms of musical communication that occurred in combination with the acquisition of certain musical knowledge.

Despite the helpful tools in *Transana* which allowed me to see relations between musical communication and the acquisition of musical knowledge, the reports merely present specific relations per clip. Due to the large quantity of my data, I had to consider a quantitative analysis, measuring specific relations between dependent and independent variables. I exported the qualitative data set into SPSS for further quantitative analysis to translate the keyword sequence maps into numeric tables. To test the associations between musical communication (independent variables) and musical knowledge (dependent variables), I used a binary logistic regression. With the *lag-function* in SPSS, I was able to research not only the relation between events that occurred simultaneously but also whether a communication had its effect at a later moment, i.e. in one of the video fragments following the one that registered the occurrence of said communication, or potential cause. The *lag-function*, thus, created lags with various lengths to determine whether the impact of an independent variable was more likely to be immediate (in the same fragment), or somewhat delayed (occurring 1, 2 or 3 fragments later). The latter situation makes theoretical sense since some communications may take some time to take effect, requiring additional practice before the relevant skill is mastered. Using the lag-function in assessing the timing of effects, it was possible to select the optimal time frame between each musical interaction and the resulting musical knowledge. Noteworthy, in most cases the impact of a certain form of interaction, including specific gestures and entrainment, occurred immediately. In only 18 out of 78 measured relations, the impact occurred later in time. Since the 513 clips come from 12 selected recordings, I inserted dummy variables to identify from which recording each clip was taken. In addition, I used the duration of each clip as a control variable to take into account the fact that the clips were not of equal length but rather represented meaningful occurrences

Deploying mixed methods in musicology and the field of music education is still a largely unexplored methodological approach. Combining two methods, however, has certain merits. First, using a quantitative analysis allows me to assess the relations between variables where these might not be immediately clear from visual inspection of the transcriptions. As such, the quantitative results direct my focus to certain elements in the transcriptions that warrant closer attention and inform me about potential lags between cause and effect that are particularly difficult to identify visually. Scrutinizing the transcripts will subsequently help explain how these relations come about. Hence, the qualitative episode reports serve as explanatory aides, offering a detailed description of the relations between the variables. As such, the quantitative analyses are exploratory, helping me to

identify relevant connections between the variables and find illustrative clips. Although the data structure is nested, with multiple observations for each band, we did not apply a multi-level analysis. As only five bands were observed and we were not primarily interested in differences in statistical relations between these bands, I opted for a more straightforward calculation of odds ratios and logistic regression coefficients. While this approach may lead to some over-estimation of effect sizes, I decided to go with it since not many significant relations were found anyway due to the limited number of clips and the fact that some dependent variables turned out to have a very skewed distribution (or: did not happen a lot). In addition, my understanding of what happened during band rehearsals is primarily based on the subsequent qualitative analysis of the clips and the concomitant episode reports that were identified bases on my quantitative explorations, so not much meaning is attributed to actual effects sizes.

To illustrate the arguments put forward in this article, I selected 13 video fragments, inviting the reader to see and hear how the learning process takes place. A QR-code directly links the reader to a video[10]. The use of this technology is introduced as an attempt to increase accountability in social research. Watching these videos allows the reader to actually hear and see interaction processes take place.

[10] Use your Smartphone to scan the QR-Code or click on the hyperlink

Results

Patterns of bodily learning

How do forms of interaction, gestures and entrainment result in the acquisition of musical knowledge and skills? Addressing this question requires a systematic analysis of the individual relationship between each form of musical communication and the acquisition of rhythmic patterns, cohesion, form, melody, harmony, and theory. In this context, patterns refers to the chain of events from the first attempt of learning to full acquisition of a musical skill. In each section, I demonstrate the findings in cross tables, logistic regression parameters, sequence maps (*Transana*) or pathways, depicting a chain of events that lead to acquisition of musical knowledge and skills. In the cross tables, I will only present significant relations between patterns of musical interaction and musical skills and knowledge. Throughout the data set, the default for almost all independent variables is lag=0 (immediate effect on the dependent variable). In case the impact of each independent variable is more likely to be delayed, I will mention this specifically.

Acquisition of rhythmic patterns

Rhythm is an important musical parameter in collaboration with other band members. Failing rhythmic cohesion with peers inevitably disturbs the groove or flow of a song. Not surprisingly, the bulk of practicing time is allotted to correction and acquisition of rhythmic patterns. Looking at the relation between forms of musical communication and rhythmic learning, the logistic regression in table 1 shows that the use of pantomimic gestures significantly ($p<0.000$) enhances the acquisition of rhythmic patterns. The odds ratio Exp(B) in table 1 provides an estimate for the relationship between two binary variables: pantomimic gestures and the acquisition of rhythmic patterns. The first column represents the odds that a student acquires a rhythmic pattern *without* pantomimic gestures which is estimated by the proportion 0.076[11]. The second column shows the odds that a student masters a rhythmic pattern *with* pantomimic gestures which is estimated by the proportion 0.375[12]. In other words, the odds of rhythm acquisition in combination with pantomimic gestures is almost 5 times

[11] Odds without pantomimic gestures: $\frac{31}{405} = 0{,}076$

[12] Odds with pantomimic gestures: $\frac{21}{56} = 0{,}375$

higher than the odds that it occurs without pantomimic gestures[13]. Furthermore, the cross table indicates in the second row that the likelihood to acquire a rhythmic pattern after pantomimic gesturing is 27.3% while this percentage is only 7.1% without pantomimic gestures.

Table 1. Rhythmic patterns

		Pantomimic		
		No	Yes	Total
Rhythmic Patterns	No	405	56	461
		92,9%	72,7%	89,9%
	Yes	31	21	52
		7,1%	27,3%	10,1%
Total		436	77	513
		100%	100%	100%
		B	**Sig.**	**Exp(B)**
		1.589	.000	4.899

***p=.000

Based on the episode reports, I will extrapolate on the significant effect of pantomimic gestures on rhythm acquisition. Especially, syncopated rhythmic patterns are central to this analysis. Syncopated notes (off beat rhythms) prove to be the biggest challenge for the band members. Throughout the video clips the musicians struggle with irregular rhythmic patterns that disturb the regular flow of a song. The process of acquiring syncopated rhythms shows a specific pattern: 1) A student fails at playing a syncopated rhythm. 2) The teacher or peer sings the syncopated rhythm while clapping a regular beat. 3) They move their body on the beat and make depictive gestures by pointing out the rhythm in the air. 4) They move their body left to right on the syncopated rhythm. 5) They sing the notes and deploy pantomimic gestures by simulating the instrument by playing in the air. In case of repetitive failing of a student, the teacher or peer combines all of the above steps by depicting the gap between the notes with exaggerated depictive gestures, followed by shouting the syncopated rhythm, accompanied by pantomimic gestures (plucking the strings in the air), while moving the body in synchronization with the rhythmic pattern.

Depictive and non-depictive gestures usually precede pantomimic simulation. Non-depictive gestures appear to have a corrective function. The teacher and peers of KJC Rock Combo use strong head movements to push the rhythm if the band (usually the drummer) slows down (see video 1).

[13] Odds Ratio: $\frac{0,375}{0,076} = 4,9$

Besides that, non-depictive gestures, such as clapping the beat, create a steady base. In step 2, understanding the pulse is essential to play syncopated rhythms. However, understanding a steady beat does not equal feeling a steady beat, let alone mastering a steady beat while playing a syncopated rhythm.

Video 1: Non-depictive

In steps 3 and 4, before the teacher introduces pantomimic gestures, he uses depictive gestures as illustrators of a rhythm. By pointing out the notes in the air, the teacher depicts the syncopated rhythm and creates a visual image of the time and space between the separate notes (see video 2) From step 4 onward, pantomimic gestures to simulate the syncopated notes come into play and prove to be indispensable in the learning process. Each of the four steps seems to be accumulative. The teacher gradually adds more bodily information to the transmission process. As soon as students closely monitor and mirror the pantomimic gestures of the teacher, they are able to temporarily play the syncopated rhythm.

Video 2: Observation of gestures

Acquisition requires more than mere observation and imitation of syncopated movements. It depends upon active bodily involvement. During this whole process, the teachers or peers tap a regular beat with their feet whilst simulating irregular movements. This regular tapping, referred to as conscious synchronization, proves to be essential in mastering a syncopated rhythm. Meanwhile, regular tapping is the biggest challenge for the students. As soon as they arrive at the syncopated pattern, they fail to tap regularly- and unconsciously synchronise with the syncopated rhythmic pattern. Unconscious synchronization is a sign of temporary acquisition of complex rhythmic patterns. Whenever a teacher or peer requests to repeat that same pattern, the student is unable to play without mistakes. This indicates that the student only temporarily masters the syncopated

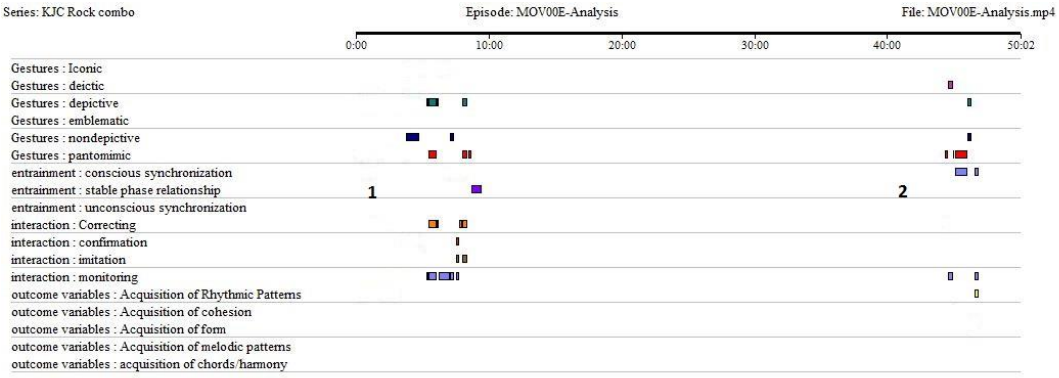
rhythm. Video 3 shows how a bass player overcomes unconscious synchronization by imitating the exact gestures and bodily movements of the teacher. Eventually, he moves his body according to the syncopated rhythm, whilst simultaneously tapping his foot in synchronization with the beat. First this occurs with hesitance, but then with full coordinated bodily involvement, demonstrating acquisition of syncopated rhythms.

Video 3: Embodiment

Syncopated notes (off beat rhythms) prove to be a point of contention for the band members. Musicians tend to struggle with irregular rhythmic patterns that disturb the regular flow of a song. The sequence report below is exemplary for acquiring syncopated rhythms throughout the band rehearsals. This learning process starts with motor imagery in which the students are likely to translate neural codes for observation to the addressed group of muscles (Calvo-Merino et al., 2005) to understand the complexity of the syncopated rhythm. In this phase students merely observe their peers or teachers without moving the body.

My data suggest that mastering a rhythm seems dependent on human action observation, followed by active bodily participation. The sequence report below demonstrates that in phase 1 (see 1 in sequence report), despite the pantomimic and depictive gestures of the teacher, the students fail at playing the right rhythm. Observation followed by musical imitation without conscious bodily involvement seems insufficient. In phase 2 (see Figure 1.), the students consciously synchronize their legs with the dominant beat, tapping a steady beat whilst playing a syncopated rhythm. In sum, for learning complex rhythms, conscious and active bodily involvement through tapping seems conducive to learning complex rhythms.

Figure 1: Sequence report: Acquisition of Rhythm



Acquisition of cohesion

On a structural level, cohesion in musical systems represents harmony, scales and rhythms. Those different musical parameters are subject to repetition, juxtaposed to one another, and articulated together, thus operating simultaneously rather than remaining independent (Middleton, 1983). As a result, the performance of music is cohesive by nature (Lomax, 1962; McClary, 2000). On a performative level, cohesion is constructed through interaction with peer musicians during performances or practices (Small, 1998; Feld, 1984). Winther (2005) raises the issue that cohesion cannot merely be understood through performance and structure only; it leaves us with the unanswered question of the workings of cohesion on a phenomenological level. How are musicians able to recognize cohesion? In this section I analyse how the students negotiate on a structural, performative, and phenomenological level with their peers by means of highly synchronized embodied collaboration to achieve cohesion.

Cohesion starts with understanding the structural aspects of music such as harmony and rhythm. In order to understand a syncopated rhythm, the students usually play rhythmic pattern combined with irregular foot tapping. They understand the pattern, but are unable to embody this and are therefore more prone to make mistakes. At the very moment students are able to consciously synchronize their tapping with the structural aspects of the music, embedding of the musical material starts, which usually leads to acquisition of cohesion on a performative level. At this stage, however, the student only acquires cohesion on an individual level, creating coherence between their body and the structure of the music. Creating coherence between band members as a collective needs interaction and cooperation with other bodies.

The results of the regression in table 2 show a very significant relation (p<0.00) between stable phase relationship and cohesion. The odds ratio Exp(B) in table 2 provides an estimate for the relationship between stable phase relationship and cohesion. The odds of success (acquiring cohesion) is around 34 times to the odds of cohesion failure. In total, students deployed stable phase relationship 77 times, which lead to successful acquisition of cohesion in 52 instances (67.5%). The same table indicates that only 25 times out of 436 (5.7%) cohesion was acquired without stable phase relationship. In sum, stable phase relationship has a significant positive effect on cohesion acquisition. Apparently, moving in an identical mode is inextricably connected to cohesion. The analysis of the episode reports of all bands extrapolates on this significance.

Table 2. Cohesion

		Stable phase relationship		
		No	Yes	Total
Cohesion	No	411	25	436
		94,3%	32,5%	85,0%
	Yes	25	52	77
		5,7%	67,5%	15,0%
Total		436	77	513
		100%	100%	100%
		B	Sig.	Exp(B)
		3.532	.000	34.195

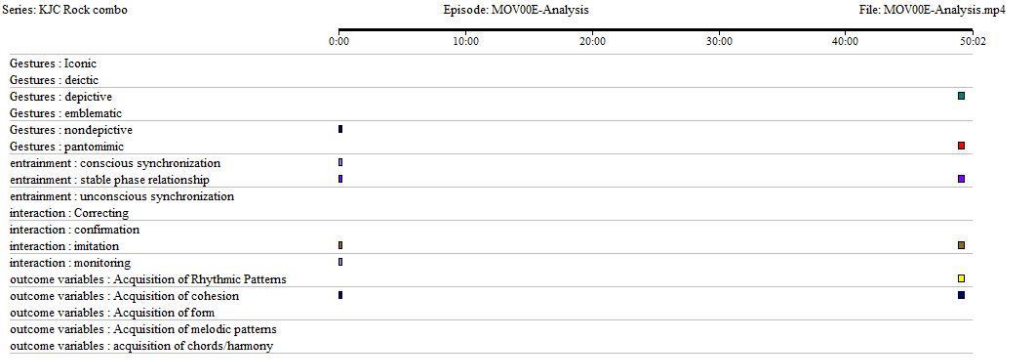
***p= .000

I use two examples to illustrate the significant effect on stable phase relationship on cohesion through the sequence map below. Example 1 starts with monitoring. During the countdown of the first verse of “Jump” (Van Halen) all band members from KJC rock combo focus on the drummer. In response to the teachers’ indication of the tempo of the beat, he clicks 4 times with his sticks and slightly moves his body down to depict the first beat (depictive). When the camera turns towards the bass and the keys, we can see the bass player strongly moves his head on the beat (non-depictive), then turning towards the teacher who moves his body identically. As soon as the drummer starts clicking the beat with his sticks the bass again turns towards the drummer and responds to that with a steady synchronized head move. The synchronized movements become identical after bodily communication and interaction between the members. This stable phase relationship results in cohesion (see video 4).

Video 4: Cohesion

In the first phase of practicing, the students from KJC Rock band first observe and then copy each other's moments, which is essential to recognizing cohesion. Upon understanding the structure of the music, students consciously synchronize their body accordingly, and check their movements with their peers. As seen in figure 2 below (0:00), they actively cooperate with other bodies, by first observing and then exactly mimicking their peers' movements. In the final phase (50:00), observation becomes obsolete since the students already understand the music and know how to align their body with the pulse (conscious synchronization). Subsequently, as the dominant beat starts they get drawn into the music and move their bodies with identical movements. As my data suggest, they seem to build upon previously observed gestures and entrainment. This finding corresponds with Calvo-Merino's study (2005) in which she observed stronger motor-related brain activities based on the familiarity of the action. The students in this current study seem to match acquired motor repertoire with acquired action and map this over new movements, eventually leading to mastering cohesion.

Figure 2: Sequence report Acquisition of cohesion



In short, we can see a similar process in video 4 when the students acquire cohesion for the second time during practicing. They start the song without monitoring. The music is ingrained in their bodies. As soon as the introduction theme starts, they immediately deploy non-depictive gestures by tapping

their feet and head. The musicians display bodily connection with the musical theme through conscious synchronization with the beat. The moment the drummer plays the fill and provides the keyboard player with a steady and dominant beat, the whole band moves in synchrony. Without relying on visual information, they move as one body in perfect cohesion.

In the first phase of practicing, observing the other and copying their movements is essential to recognizing cohesion. They understand the structure of the music, consciously synchronize accordingly with their body, and check their movements with their peers. As seen in the sequence report above, they actively cooperate with other bodies, by first observing and then exactly mimicking their peers' movements, going from interaction to phenomenological cohesion. In the second phase, observation becomes obsolete since the students already understand the music and know how to align their body with the pulse (conscious synchronization). Subsequently, as the dominant beat starts they get drawn into the music and move their bodies with identical movements. They build upon previously observed gestures and participatory entrainment. This musical information becomes ingrained in their bodies. Consequently, they move as one body, displaying phenomenological embodiment and understanding of cohesion.

During stable phase relationship, the students move identically, as one body. This could leave us with the impression that cohesion is just there by default with students; considering them moving in perfect synchronization, cohesion seems an effortless endeavour. However, phenomenological embodiment of cohesion is, as Winther (2005) already states, rather complex and built upon cooperation between band members. They do not just move in synchrony, they understand the music, interact with each other, and finally display phenomenological understanding of cohesion by exactly copying, recognizing, and remembering each other's movements.

Acquisition of form

Jazz, rock, and pop music have a very specific form. This consists basically of A for verse, B for chorus, and C for bridge. Generally, each section of a song has a symmetric structure, consisting of, e.g. 8 to 12 or 16 bars. Form refers to the intramusical organization of musical syntaxes. In other words, form is the structure of pitch, rhythm, harmony, and scales in relation to each other (Elliott, 1995). In this section, I focus on the intramusical organization of musical parameters in relation to human musical communication and possible acquisition.

Gestures are pregnant with musical information. It shows how we perceive musical structure "through processual shapes which seem to be analogous to physical gestures" (Middleton, 1993: 177). Drawing on various perspectives from anthropology and cultural theory, Middleton argues that gestures are a performance of somatic processes closely linked to musical processes, such as rhythm.

This means that the musicians in this study are likely to deploy specific gestures demonstrating their understanding of form.

In table 3 it is evident that confirmation ($p<0.003$) plays an essential role in understanding form. To explore the relation between confirmation and form, I first focus on the odds ratio Exp(B) in table 3. This indicates that the odds of acquiring form with confirmation is almost 3 times higher than the odds of not deploying confirmation. Additionally, the regression analysis shows in the same table that in case students deploy confirmation there is 17.9% chance of acquiring form compared to only 7.2% in case of not using confirmation.

Table 3. Form

		Confirmation		
		No	Yes	Total
Form	No	398	69	467
		92,8%	82,1%	91,0%
	Yes	31	15	46
		7,2%	17,9%	9,0%
Total		429	84	513
		100%	100%	100%
		B	**Sig**.	
		1.026	.003	2.791

*p= .003

In the context of this study, confirmation entails more than an affirmation via confirmative gesturing *after* a repair by the teacher or peer. Based on the analysis of the episode reports, it seems that confirmation furnishes a fixed set of gestures that feed into the process *towards* understanding form. Anticipating its multifaceted nature, I regard confirmation as a continuous process of tuning one's body with the music through active involvement of the body to confirm the dominant beat, through full concentration on musical parameters in isolation from the rest of the band members, and through deliberate synchronization of one's own body with the collective. These examples are, however, not exhaustive.

Analysing a band practice of NMC Rock combo, I focus on the communication between the singer and the bass player. The bass player plays a repetitive pattern while looking at the singer. Just before the bass player modulates his pattern, he looks at his hands, positions himself, and turns his head back to the singer. Looking down and up may seem practical at first. However, from the perspective of the singer, this movement communicates a clear message: I modulate, you modulate. Since the singer focusses his gaze continuously on the bass player, the disturbance of this mutual

gaze functions as a sign for the singer to sing his melodic line a leap of a fourth higher (see video 5). Understanding form, thus, starts with observing the other and responding to any sort of change in continuous movements.

Video 5: Confirmation

In addition, the students deploy more conscious gestures to demarcate form. In the next example, the singer of the NMC Fusion combo performs an *alaap* (a slowly performed dialogue between a singer and a scale). He uses depictive gestures to illustrate the flow of the melody. The hand goes up to depict an ascending line, down for descending lines, and a stretched arm for sustained notes. While the singer takes a break, preparing himself for the final notes of his *alaap,* the guitarist already starts his repetitive pattern. The singer starts at the same time and turns his head towards the guitarist. In doing so, he takes over the lead. The singer depicts the small inflictions of the decorated melody with his hand, stretches his arm on the sustained final note, and emphasizes this by moving his body to the right. His last movement is small, but very expressive and contains valuable information. With his small emphasis on the last note, the singer demarcates the end of the *alaap* and invites the guitarist to start his pattern (see video 6). Depictive gestures do not only illustrate the flow of a melody, but also serve as signs to mark the space in which other band members are allowed to operate.

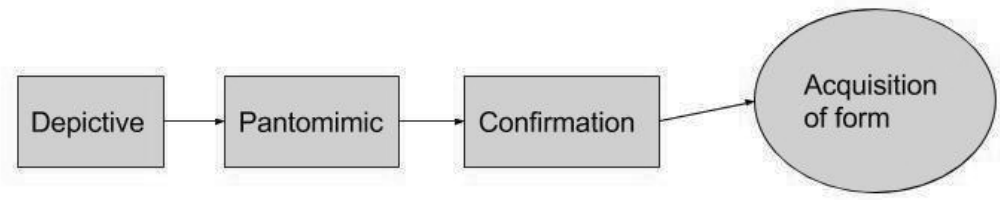
Video 6: form

As summarized in pathway 1 below, teachers and peers use depictive gestures by nodding the head on beat 3 and 4, as an announcement of a new part. Putting a hand in the air demonstrating a nearing transition is another example. Usually, the transition to a new part entails a change in the musical structure. Changing from verse to chorus means changing from sustained

chords to rhythmically more complex chords or develop from using the bass drum, the snare drum, and the hi-hat to adding the ride cymbals in order to create a fuller sound. In the next step, students use pantomimic gestures to simulate transitions. They mimic the rhythm of the guitar whenever it is about to change from straight eight notes to triplets. Those emphasized movements serve as announcers and support the student in a flawless transition from verse to chorus. Other than working towards a transition, pantomimic gestures can also confirm a flawless transition. Mainly, whenever drummers change from the hi-hat in the verse to the ride cymbal in the chorus, peers or teachers move their hand in the air to simulate the change. During the third step, the students process the depictive and pantomimic gestural information which serves as confirmation on their transition to the next part. Finally, after bringing the observed information into practice successfully, the students receive a token of affirmation which confirms they acquired the form of a song in the last step of the pathway.

Confirmative gestures such as depictive and pantomimic gestures not only contain information regarding the transition, but also on structural musical aspects, such as dynamics or tempo, and is therefore important for the students to gaze upon.

Pathway 1: Acquisition of form.



Acquisition of melody

Since there are not enough clips in which melodic acquisition plays a prominent role, the logistic regression shows no significant relation between any type of musical communication and the acquisition of melody. The instrumentalists predominantly play chords and rhythms in the rock and pop combo's, while the singer is the only one performing a melody. Those melodies are usually catchy earworms, part of a collective musical knowledge, whereas virtuous melodic phrases characterize the material used by the jazz combo. Besides virtuosity, the melodies are rhythmically complex and rather lengthy. It goes without saying that jazz melodies are therefore harder to master.

The few cases in which melodic acquisition occurs are subject to qualitative analysis, drawn from the episode reports.

During practice, the students seldom use written music in the form of tabs and chords, let alone music notation. They prioritize auditory learning over written sheet music (Van den Dool, 2016). Consequently, learning a melody mainly relies on a good ear and an infallible memory. Whenever the latter happens to fail, the students use their phone, hold it close to their ear and listen to the specific melodic phrase with utter concentration. This mode of correction occurs on an individual level and accommodates no communication with peers. Playing that same melody with other band members evokes various forms of communication, following a specific pattern of learning below.

First, learning a melody starts with making mistakes. Whenever a student fails at playing the right melodic phrase, peers correct the instrumentalist or singer by making an emblematic gesture, such as a stop sign with the hand or disapprovingly shaking the head. In response, the student monitors his peer who either chooses to play the pattern on his own instrument, which is an iconic gesture, or points with deictic gestures to the right fret or key on the instrument. The latter obviously forces the observing student into being an active learner, trying to find the right note with a little help from his or her peer. Another frequent form of communication is depictive gesturing. When a student is able to find the right notes, peers often sing the melody while depicting its contour by moving the hand in the air accordingly. With the other hand or foot, peers support the contour of the melody by steady tapping or clapping of the beat. This provides a crucial rhythmic context for the learning student. In addition, students and teachers deploy pantomimic gestures to simulate fast patterns, accompanied by (not in tune) singing. I will exemplify this pattern of musical communication by analysing two different clips from the NMC pop combo and NMC jazz combo.

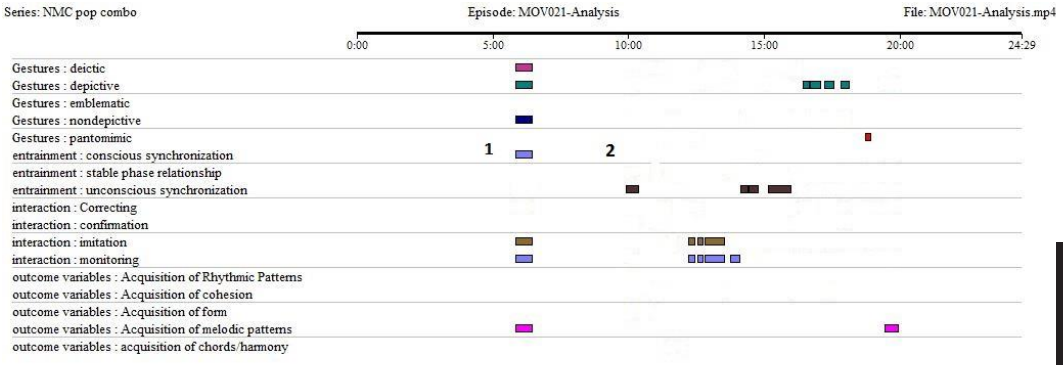
There is one moment in which the guitarist of NMC pop combo struggles to master a melodic pattern. He looks up, starts to play the pattern, doubts, starts again, and accompanies his playing by singing the pattern. Singing plays an important role in the learning process; it provides feedback and helps the student to check the correctness of the melody. In addition to individual feedback, peers also use singing to provide feedback. While the guitarist makes another effort to find the right notes of his melodic pattern, the drummer closely monitors him. The guitarist plays along with the track, but hesitates with the last fast melodic phrase. The drummer sings a high pitched, not totally correct interpretation of the melody. Nonetheless, his singing helps the student to hear all the separate notes instead of one blurry fast line. In addition, the drummer accompanies his singing with pantomimic gestures. He moves his fingers over an imaginary guitar, simulating an ascending melodic line. He emphasizes the last high pitched notes by lifting his shoulders in the air, depicting the final note (see video 7).

Video 7: Pantomimic

The above gestures play a central role in acquiring a melody. I detect two phases in the learning process, presented in the sequence map below: First (see figure 3 number 1), the guitarist displays conscious synchronization by moving his head according to the beat on the first, relatively easy, repetitive phrase. Aligned with conscious synchronization, we can see non-depictive gestures in the sequence map. His non-depictive tapping or moving according to the beat indicates acquisition of the first melodic phrase. Second (see figure 3 number 2), when the melody becomes harder to detect, he stops moving and tapping regularly. Displaying unconscious synchronization indicates difficulty with acquiring the melody. We can see in the sequence report that the guitarist monitors and imitates the movements of his peer, who emphasizes the last high pitched notes of the second melodic phrase by moving his shoulder up in synchronization with the ascending melody. Furthermore, I selected depictive and pantomimic gestures in the sequence map. Emphasizing the second ascending phrase with a depictive gesture seems to help the guitarist to understand the contour of the melody (see video 8). Subsequently, monitoring pantomimic gestures, imitating them, and deploying those as depictive gestures to accentuate a phrase is key to acquiring a difficult melody.

Video 8: Melody

Figure 3: Sequence report Acquisition of Melody



As stated earlier, jazz melodic themes and variations thereof are often virtuous and lengthy. Hence, those phrases are hard to master. In the following example, a bass player and a guitarist practice a jazz composition that they both learned by ear. Analysing the episode reports, I discovered a pattern in their musical communication process, eventually resulting in the acquisition of complex melodic phrases. It all starts with making a mistake. The bass player realizes his error (ending the phrase with a whole instead of half a step down) and monitors his peer pending for feedback. In response, the guitarist mirrors the bass player by playing the right phrase (iconic gesture), emphasizing the last note (depictive gesture) with his body, moving slightly forward. The bass player monitors and imitates the guitarist, but fails to play the right final note. In addition, the guitarist provides feedback through deictic gestures, waving with his hand, indicating that the bass player needs to shift. If that is not sufficient either, he makes his depictive gesture more accurate by literally pointing at the right fret, deploying a deictic gesture. The bass player repeats the phrase, ending with the right note, imitating the guitarist by emphasizing the final half step down through bending his body forward. In short, acquiring a melody starts with iconic mirroring, emphasizing the final note with a depictive gesture, followed by depictive and deictic gestures. Eventually, in a final effort the depictive move forward not only depicts the final step down, but also emphasizes the acquisition of the phrase (see video 9).

Video 9: Jazz melody

In the second example, both musicians listen to the music track and try to master a virtuous melodic line. Again, they follow a specific pattern. While listening to the track, the guitarist depicts the ascending melodic phrase by pointing forward. He accompanies this depictive gesture with singing rather monotonously, but rhythmically, with an emphasis on the last note. The guitarist seems to play the fast phrase without being consciously aware of the separate notes. As soon as he starts playing in a slower tempo, the guitarist displays doubt about the contour of the melody by holding his hand against his mouth, followed by looking up while inwardly humming the melody. After a few unsuccessful attempts the guitarist stops, looks up, sings the melody and emphasises the last note with his hand. Right after this depictive gesture, they play a flawless version of the final phrase (see video 10).

Video 10: Depictive gesture

Interestingly, the inward communication process of the guitarist seems to have an effect on the collective performance of both musicians. Apparently, gazing upon the attempt of a peer to master a melody is contributive to acquiring a collective melody. This example shows that singing in combination with depictive gestures renders a positive effect on the acquisition of a melody. Emphasizing the final sustained note creates awareness of the contour of the melody, even when the phrase is fast and difficult to separate to individual notes.

Acquisition of music theory

As with melodic acquisition, the logistic regression shows no significant relations between forms of musical communication and the acquisition of theory. This is due to the low number of clips (only 5 out of 513) in which theory plays a role. For further analysis, I draw upon the episode reports of the NMC fusion band. This is the only band in which theory seems to be a learning objective.

The teacher of the fusion band aims at blending jazz music with Nepali and Indian classical music. Before the band class, he teaches the students about motives, as thematic units of a composition. The overarching theoretical theme of the band class, right after the theory class, is learning to distinguish and compose motives. The teacher starts with verbally explaining what this concept entails: "a motive is the building block of a composition." He accompanies his words by depicting a block, moving his index finger and thumb up and down, demonstrating the development of a motive throughout a composition. Besides depictive gestures, he points at the individual band members that each of them needs to play and develop one motive. The foundation of the melody is a repetitive (ostinato) bass line. The teacher depicts the bass line with his index finger and thumb, while making a circle with his other hand, illustrating the repetitiveness of the ostinato motive. With another depictive gesture, he demonstrates how the melodic motives of the rest of the band members run like a red thread through the bass line. In conclusion, he finalizes his lecture by saying: "One bass line, and one motive for you all", pointing with his fingers to the guitarist, flutist and singer (see video 11).

Video 11: Depictive gestures

The band members closely monitor the teacher, while he illustrates the theoretical concept with depictive gestures. Those gestures contain information on the length of the motive (index finger and thumb are close to each other) and the development of a motive (he moves his hand up and down, depicting the possibility to modulate a motif). Creating a clear image of an abstract theoretical concept makes the intangible concept tangible and seems to support the students in the creation of their own composition. They now understand the length and the harmonic development of a motive on a cognitive level. Putting this theoretical knowledge into practice, the bass player develops a repetitive motive, serving as a base for the composition. In turn, the rest of the band members

practice a simple motive that serves as a building block for their composition. The result is definitely worth watching (see video 12).

Video 12: Fusion performance

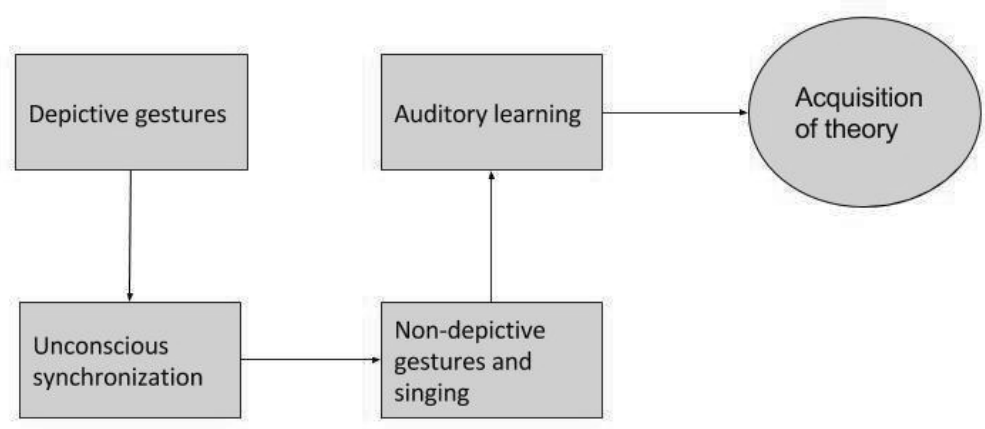
Another feature of theoretical acquisition is the negotiation with sheet music. The band members learned the musical material by heart, mainly by listening to the track. During the band class, the teacher provides sheet music, mostly to serve as a guide-line, but also to make the students familiar with notation. This seems at odds with auditory ways of learning. However, most students seem determined to learn notation and try to use it. In the following analysis, I will explain the way students negotiate with sheet music in acquiring a chord progression.

Since the students of the KJC rock combo learned “Jump” by ear, they are prone to making harmonic mistakes or replacing original chords with their own interpretation. The guitarist encounters this problem when he plays a descending chord progression. After a few unsuccessful attempts, he finally resorts to the sheet music. Starting again he plays a flawless descending pattern, moving his body on the beat, eyes focused on the sheet music. Coming closer to the specific error, he looks down at his own hand, and back to the sheet music again. He embodies his doubt with unconscious synchronization, moving his body irregularly. Furthermore, he changes his position and sits closer to the sheet music. At first this seems necessary for reading purposes only. However, the student is not actively reading the chords. The teacher notices this and starts singing the descending line. The fact that he is not reading but listening becomes clear when the student immediately responds to the dissonant chord. He changes his chord based on auditory information, not on the notation in front of him. Acquisition of theory in the form of music notation requires a perfect blend between visual and auditory information and years of practicing. In this context, music notation serves as a guide line, but does not immediately necessitate acquiring chords and harmony. For that, the active role of a peer or teacher is pivotal.

As summarized in pathway 2, depictive gestures serve as illustrators of theoretical concepts, making an intangible concept tangible. Going from understanding to performing a theoretical concept, students often fail at implementing the recently learned knowledge. This struggle is noticeable in the display of irregular tapping in regard to the regular beat. Unconscious synchronization, the phase in which the students show feeling lost, is met with non-depictive

gestures and singing. The non-depictive gestures serve as beat markers, guiding the body to align with the dominant pulse. In addition to the beat, singing helps to demarcate the length of a motif, forcing the student to simplify the thematic unit, or it is conducive to performing a complex melody or rhythm. The latter deserves some additional explanation. Many students struggle with reading staff notation and fail at performing a complex rhythm from sheet music. Instead of reading that frightening alien language, they rather learn the melody or rhythm by ear. Albeit not satisfactory for teachers, auditory learning seems to be students' shortcut to eventually acquire theoretical concepts.

Pathway 2: *Acquisition of theory.*



Acquisition of harmony and chords

In this final section, I will analyse which forms of musical communication affect the acquisition of chords and harmony. The result of the logistic regression in table 4 shows a near-significant relation between harmony and monitoring ($p<0.054$). The precise relationship between harmony and monitoring is expressed in the odds ratio (ExpB). The likelihood that monitoring occurs and successfully leads to harmony acquisition is more than 2 times to the odds that this event does not occur. Furthermore, the second row shows that deploying monitoring renders a chance on the acquisition of harmony by 7.0% to the probability of 3.2% without monitoring.

Table 4a shows that the effect of monitoring is not only immediate, but in other instances it takes some time to take effect. By assessing the timing of effects with the lag-function we can see that the impact of monitoring has a delayed effect on the acquisition of harmony. Exactly 1 fragment later in time, table 4a shows a similar relation between harmony and monitoring ($p<0.056$). Albeit slightly less significant, the odds that harmony is acquired in combination with monitoring is still 1.5 times higher than the odds that it does not occur. Similarly, table 4a indicates that 14 out of 224 times the use of monitoring was contributive to harmony acquisition, which counts for 6.3%. In contrast, 10 out of 273 times harmony was gained without monitoring, which counts for only 3.7%. In sum, monitoring significantly affects the acquisition of harmony both immediately and 1 fragment later.

Table 4. Harmony

		Monitoring		
		No	Yes	Total
Harmony	No	274	214	488
		96,8%	93,0%	95,1%
	Yes	9	16	25
		3,2%	7,0%	4,9%
Total		283	230	513
		100%	100%	100%
		B	**Sig.**	**Exp(B)**
		.823	.054	2.276

*p=.0054

Table 4a

		Lagmonitoring		
		No	Yes	Total
Harmony	No	263	210	473
		96,3%	93,8%	95,2%
	Yes	10	14	24
		3,7%	6,3%	4,8%
Total		273	224	497
		100%	100%	100%
		B	**Sig.**	**Exp(B)**
		.413	.056	1.511

*p= .0056

To back up the numbers and to detect patterns in the data, I again draw on the episode reports. In this analysis, I scrutinize how guitarists and pianists master certain chord progressions. This analysis is not limited to chords alone. The bass player and singers also contribute to the formation of harmony, and are therefore included in this section.

Perhaps the most striking features of harmonic acquisition are individual monitoring and peer monitoring. In discussing four examples related to those core features, I will try to bring out three patterns of acquiring chords and harmony. In conclusion, I will merge the core features of the three patterns in one pathway (see pathway 3 below). The first pattern of individual monitoring occurs right after the student identifies a break from the harmony by making a mistake. He or she starts monitoring a peer, usually by gazing upon the instrument, confirming the right position of the hand. Immediately afterwards, the student reflects this information by looking back at his own instrument. Coupled with gazing at the hand position, the student tries to imitate the peers' head movements or foot tapping. Whenever a student misses a chord or learns a new chord of the progression, he breaks the conscious synchronization, and focusses on the hands of a peer, accompanied by irregular tapping or head movements. Unconscious synchronization always precedes conscious synchronization. Conscious synchronization creates rhythmic awareness that in turn seems to support the student placing the newly learned harmonic information into a musical framework. As soon as the students master the technical aspects of placing the fingers on the right keys or snares, deliberate bodily confirmation through regular tapping occurs and full acquisition of harmony and chords soon follows.

The second feature is peer monitoring. In the next two patterns of learning I will explain the active role of a monitoring peer or teacher contributing to the acquisition of harmony and chords. The first pattern starts with identifying a mistake. Immediately after that, a peer corrects the students by naming specific notes. In all the relevant collected clips, this seems not to affect the learning process. Only when a peer deploys a deictic gesture, like pointing at the fret or key and waving with his hand up or down with depictive gestures to guide the student to the right position, this seems to yield result. Especially depictive gestures have a demarcating function, separating one chord from another. At first a chord progression sounds like a blurry whole. Separating them with a depictive head emphasis on each chord accommodates the unravelling of this blurry phrase. Gestures serve as non-linguistic descriptions of musical information. The deliberate, but sometimes spontaneous behavioural actions (Leman, 2008) are gazed upon by the students. They first observe the non-linguistic descriptions whilst actively creating an image of the musical performance itself and feel the music in their muscles (Cox, 2011). As soon as the students shift from imagining the music to playing, they tend to unconsciously move in synchrony with the (syncopated) chords, instead of

moving in synchrony with the steady beat. Due to an unconsciously synchronized body, most often students do not master the chord progression in this phase of the process.

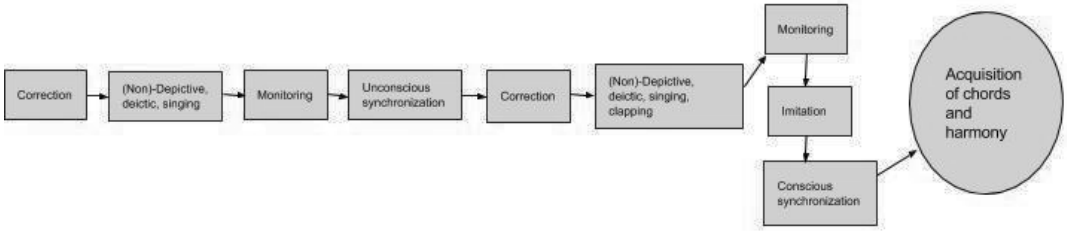
Full acquisition requires one addition. After having identified a mistake, a peer resorts to mirroring the chord progression, playing it on his piano or guitar. This iconic gesture requires the scrutinizing gaze of the student, following the chord progression note by note. Most importantly, the student imitates not only the chords, but also the bodily gestures of the teacher. In addition, the student needs to deploy deliberate and synchronized feet tapping on the steady beat. As with all other forms of music interaction, gestures support the acquisition of chords and harmony. If this endeavour is successful, they continue with a new chord progression, following the above pattern. If not, the whole cycle starts from the beginning again.

The third pattern of learning resembles the previous one in terms of peer or teacher involvement, but differs in terms of resources. I will exemplify this by analysing a clip form the KJC rock combo. In this odd case, the band members use sheet music to master the challenging syncopated chord progression from the theme from the rock classic “Jump”. The pianist clearly displays his discomfort with this strategy, but is determined to use notation as a means for his goal. Having identified a mistake, the teacher points at the sheet music while illustrating the rhythm with a depictive gesture. Even when he starts singing along, the student is unable to perform a faultless chord progression. In addition, the teacher moves his head and fingers on the beat with non-depictive gestures, creating a steady framework to which the syncopated rhythm is juxtaposed. Although the student merely concentrates on his own hands, the teacher refers to the sheet music by pointing at the score with deictic gestures. Especially when the pianist repeatedly makes the same error, the teacher sings the right top note of the chord and points at the specific bar. He accompanies this gesture with strong depictive head movements, emphasizing each individual chord and, more importantly, when to change the top note. The teacher employs his whole body to announce that particular change. Since the chord progression is rather repetitive, the chord change proves to be a challenge for the pianist. As seen in the previous pattern, the teacher now resorts to iconic gestures, playing the chord progression for the pianist. The student mirrors this action, but fails again, illustrated by unconscious synchronization by moving his head in accordance with the syncopated rhythm of the chords. After some futile attempts to divert the students’ gaze with deictic gestures from his hands to the sheet music, the teacher finally stands straight and changes his strategy. He loudly claps the beat and sings the top notes of the chord progression. The pianist listens and moves his body on the beat. This preparation proves to be of utter importance. The embodiment of the beat with non-depictive gestures not only creates a rhythmic context, but also gives the student a moment to observe the progression from a distance. Watching the video clip we can imagine how he faces his recurrent mistake while listening to the theme. During the performance of the chord

progression, he lifts his shoulder on the specific spot of his previous error. In addition, he embodies the descending chord progression at the end of the pattern slightly tilting his head and frowning his forehead (see video 13).

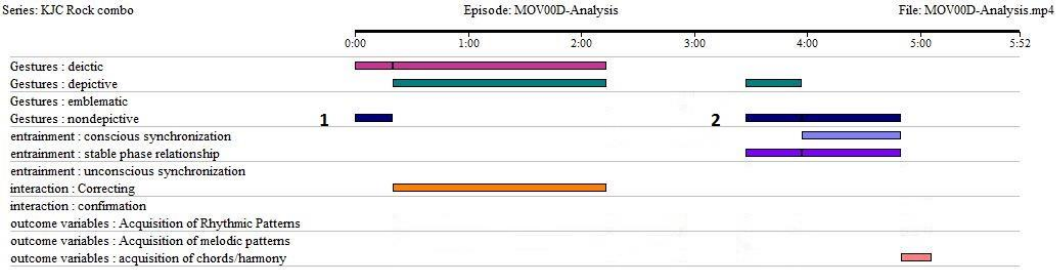
Video 13: Chords and harmony

Pathway 3: Acquisition of chords and harmony



In conclusion, as seen in the above pathway, the key to acquiring chords and harmony is underpinned by a combination of non-depictive and depictive gestures with conscious synchronization. As demonstrated in the sequence report shown in figure 4, phase 1 (see number 1), correcting a student by pointing at the sheet with deictic gestures and naming chords or notes does not seem to have the desired effect. Even using depictive gestures, illustrating the chord progression for almost 2 minutes, does not result in acquisition of chords and harmony. Phase 2 (see number 2 below) starts with unconscious synchronization, displaying the students' inability to synchronize with the beat. Meanwhile, the teacher deploys deictic gestures to steer the student's gaze from the hands to the sheet music. Reluctantly accepting that the focus of the students regularly diverts from staff notation, the teacher uses depictive gestures and sings along to illustrate the chord progression. Increasingly, the student seems to grasp the chord progression, first with conscious synchronization and later with stable phase relationship with other bodies. As seen in number 2 in the sequence report below, this finally results in acquiring a specific chord progression.

Figure 4: Series sequence report Acquisition of harmony and chords



Generic patterns

My data suggest that specific combinations of particular gestures, musical interaction, and forms of entrainment link to the acquisition of musical knowledge. Although each of the five musical skills requires a specific pathway and combination of musical communication, the data show two generic patterns that are pivotal to acquiring musical knowledge.

With regard to the first pattern, the band members in this study observe teachers or peers to learn a particular rhythm, chord or melody. During this phase, they observe particular gestures and musical movements comprising the imagination of their own musical performance, feeling the musical phrase or rhythm in their muscles (Cox, 2011). They focus on pantomimic gestures to know when to go from part A to B or to understand how a syncopated rhythm should sound. Upon imagining a rhythm or melody, students focus on each other's bodily movements, simulating rhythmic or melodic contours. Depictive gestures are crucial for understanding the contour of a melody. Focusing on non-depictive gestures, thereby creating a visual image of time and space between notes, aides to understand rhythmic patterns. Iconic gestures, mirroring a certain musical action, seem to help the observer to see exactly how to arch the fingers on a keyboard or which notes to play. Finally, looking at emblematic gestures such as stop signs and confirmatory thumbs up, caters to constructive correction or confirmation on musical decisions. Another form of observation that usually operates simultaneously with monitoring gestures is auditory monitoring. When gestures alone do not suffice, teachers tend to accompany non-depictive steady speed markers with singing the melody. Listening to the beat assists in juxtaposing a syncopated rhythm in between the steady hand claps. Furthermore, listening to the melody while gazing upon depictive gestures and creating a visual image of the melody, is at the base of acquiring unfamiliar musics. In sum, The first pattern, in which they mainly observe their peers or teachers, comprises of human action observation (Calvo-Merino et al., 2005), imagining the observed movements and connecting the material to acquired musical knowledge and skills. The observation of gestures, bodily movements, and auditory information represents the first step in acquiring musical knowledge and skills.

The second generic pattern entails the transition from human action observation to conscious and (un)coordinated participation of the body. Having observed and imagined gestures or auditory information, the learning process usually continues with active bodily participation. I detected three levels of bodily participation. At the first level, knowing the right notes and incidentally performing the right rhythm characterizes structural musical knowledge, but does not result in a flawless performance. In this phase, students merely produce the right notes and rhythm without conscious bodily participation. They tap their feet or move their body irregularly, whilst playing the melodic or rhythmic pattern. Most often, the students move their body in

synchronization with syncopated rhythms, lacking a steady beat. Possibly due to uncoordinated and unconscious synchronization of the body, they are prone to make mistakes.

At the second level, students demonstrate musical acquisition through conscious and coordinated bodily participation. For example, a syncopated rhythm is accompanied by a steady tap on every beat in concurrence with accentuating off beat notes with their upper bodies. The episode reports and the keyword sequence reports show a strong relation between conscious synchronization and the acquisition of musical knowledge and skills. Consciously tapping a beat while simultaneously playing a syncopated rhythm seems to contribute positively to the acquisition of musical parameters on an individual level. Pathway 2 (acquisition of chords and harmony) is a perfect example of how students traverse the bumpy road of learning a musical skill. At first, they deploy unconscious synchronization by moving a-synchronous to the beat. After a series of corrective gestures, they become aware of the beat and how much support it can offer during the learning process after they deliberately connect their body with the beat. Whether they strive to master a complex rhythm, a chord or cohesion, every learning sequence ends with an exact copy of the teacher's corrective gestures and deliberate bodily involvement.

The final and third level entails the acquisition of musical knowledge and skills on a collective level. Whenever students employ conscious synchronization, they shift from moving their bodies according to individual musical parameters to collective musical motion. This usually occurs in the chorus when they create a steady groove. A groove is not simply a steady pulse that defines a certain style of music that we can take for granted. It is the result of articulation, accent, and note placing at a specific tempo that defines the groove (Middleton, 1993). Note that the groove has to be constructed between musicians over and over again. This collectively determined aspect between players and the musical material creates a groove that is variable in every performance (Keil, 1995: 3). The variability in a groove is caused by the musicians' display of sensitivity to musical timing in contrast to computer generated music (Desain & Honing 1996.). The slightest delay, microtonic descend or acceleration, or variable in every performance is part of the musical texture. In order to understand the underlying process of the groove, the students concentrate on the movements of the bodies of their band members. They copy each other's movements and move as one body, subsequently creating an infectious beat. This stable phase relationship contributes to a cohesive sound, demonstrating full acquisition of unfamiliar musical knowledge and skills.

Conclusion and implications for education

The foregoing analysis suggests that musical knowledge arises out of bodily interaction between the band members. Based on somatic theories from Merleau-Ponty, Bourdieu, Damasio, Bowman, Howson, Crossley, and Shilling, I now draw conclusions about the indispensable role of the minded body in musical learning. In addition, I extrapolate on these theories and my findings by sharing how an account of the minded body is conducive to music education.

The convergence of the dualistic divide of pure minds and bodies into "body-subjects" (Merleau-Ponty, 1996), is not a purely theoretical conjuncture. As stated in the theoretical section, recent findings in neurosciences highlight the connection between emotion and cognitive processes. Learning, decision making, and reasoning are subsumed within emotional thought (Yang & Damasio, 2007). Consequently, cognitive processes are grounded in action. The minded body learns by doing (Bowman, 2004). As seen in the result section, observation of particular gestures and the embodiment of musical structural aspects through imitation of gestures and conscious synchronization on an individual level, followed by stable phase relationship on a collective level, enhance acquisition of musical knowledge and skills. This bodily constituted knowledge becomes ingrained in the music student's system by observing the other, through embodiment of musical structural aspects and gestures, and entrainment with other bodies. The conjuncture of body and mind as well as the interaction with other bodies (Clayton, 2007) is essential to the acquisition of musical knowledge and skills.

With this study, I claim that conscious embodiment of musical information significantly enhances the acquisition of musical knowledge. This finding challenges the pervasive body-mind dualism and offers a paradigm for music education and education in general that would reflect on deeply rooted body-mind learning strategies and transmission of knowledge. This realization has two important implications for music education.

First, during the transmission of musical information, the body of the teacher or peer plays an indispensable role in the learning process. Transmission of musical information through gestures underpins musical learning. In order to acquire rhythm, cohesion, form, melody, music theory, or chords and harmony, the teacher deploys a certain pathway of gestures. Those gestures can, however, also occur simultaneously, and are usually accompanied by audible information. For example, a teacher can clap a steady beat (non-depictive gestures) while accentuating a syncopated rhythm with his shoulders (depictive gestures and conscious synchronization), coupled with singing the melody. Observing the body of the teacher means gazing upon full embodiment of musical information. The teachers' pathway of gestures is pregnant with information, telling the student

exactly what and how to play. Subsequently, the students, in order to acquire musical skills, need to observe those gestures attentively. Furthermore, they need to imitate the bodily movements.

That brings me to the second implication. My research suggests that acquisition occurs when gestures are copied, when the body is in synchronization with musical aspects, and when the body is in congruence with other bodies. Learning, thus, should be focused on consciously aligning the body with the music. Teachers should encourage students to become increasingly bodily aware in an early stage of the learning process. During the human action observation phase when gestures are deployed to convey musical information, the students could already deliberately imitate the movements in preparation for the participation phase. By doing so, the students actively connect the musical image with coordinated bodily movements. Consequently, as the cognitive processes are grounded in action, musical skills and knowledge solidify in the learner.

In this case study, young musicians utilize their bodies to learn music. Since musicking is an embodied action, it expresses deliberate and spontaneous musical information and aims at a collective understanding (Leman, 2008). It stands to reason that students in other parts of the world also use their bodies and focus on the bodies of their peers to acquire musical knowledge. Although the body is used differently from place to place and varying per musical style, the body is essential to music making. Since the analysis in this research clearly shows that active bodily involvement significantly enhances the acquisition of musical knowledge, I strongly encourage teachers (also outside the realm of arts education) to investigate when and how the body is conducive to the acquisition of knowledge. For example, it might help music instructors in classical music to understand how gestures are conducive to enhancing reading skills or, if appropriate, cater to less dependence on staff notation. Furthermore, understanding why students deploy unconscious synchronization at specific moments could provide teachers some useful information about the difficulties of the students' learning processes. Subsequently, teachers should map their students' learning styles and guide them in an embodied learning experience, connecting their minded bodies with the music.

A pedagogical shift, in which the body is taken seriously, might drastically change the classroom. Consequently, this might lead to a less disciplined body. However, as Yang and Damasio argue: "When we educators fail to appreciate the importance of students' emotions (the body), we fail to appreciate a critical force in students' learning. One could argue, in fact, that we fail to appreciate the very reason that students learn at all" (Yang & Damasio, 2007:9). Subjugating the body to the mind forms a hindrance for the learning process and undermines the embodied aspects of students' learning preferences. Conversely, tapping into the largely unexplored role of the minded body in education liberates the elusive body and opens a realm of active and engaging learning strategies.

Chapter 4

Sensory learning and the acquisition of musical knowledge and skills

Sensory learning and the acquisition of musical knowledge and skills

Introduction

For centuries already, progressive theories, ranging from Rousseau's (1726) notion of the child as a mini scientist to Montessori's (1967) educational system in which the child can develop its mind through movement, have advocated that embodied approaches to cognitive learning enhance the acquisition of knowledge. This has been amply confirmed in recent empirical studies (Alibali & Nathan, 2012; Cook et al., 2008; Yang & Damasio, 2007; Glenberg, 2004; 2008). Despite convincing data on the essential role of the body in learning, embodied learning did not crystalize into sensory educational systems in the classroom. Formal learning, with the emphasis on the top-down transmission of knowledge and cognitive learning, still prevails in many schools worldwide (Thomas, 2013).

In chapter 2, I theorized how musical knowledge and skills arise out of bodily interaction. I demonstrated that embodiment of musical information significantly enhances acquisition of musical knowledge and skills. Yet the theorization of embodiment as united bodies and minds in which cognitive processes are grounded in action, requires sensory refinement in the context of musical learning. In addition to focusing on the relation between interaction and the acquisition of musical skills, I will explore how young musicians deploy sequences of sensory learning such as visual, kinaesthetic, and auditory learning to acquire musical skills. This study moves from embodiment to emplacement; suggesting a sensory interrelationship between body-mind-environment (Howes, 2005). The aim of this research is to demonstrate how music students deploy bodily senses in different phases of learning through interaction. In order to understand sequences of sensory learning, I focus on interaction sequences between students in the musical learning process. Interaction between peers or between a teacher and students is pivotal to learning and usually entails bodily action. For the analysis of interaction sequences, I draw on findings of previous fieldwork on musical learning processes from which I selected four essential elements of interaction during a rehearsal (Van den Dool, 2016).

Based on a case study carried out in Amsterdam, The Netherlands, I aim at answering the following threefold question: Which interaction sequences and sequences of sensory learning do band members follow during a rehearsal? How do different senses translate into each other within these sequences? How does intersensory learning give access to musical knowledge? First, I focus on sequences of musical interaction forms and the use of sensory tools between teacher and student and between peers. This serves as a framework to understand which tools students use to gain

musical skills during a rehearsal. Scrutinizing these sequences demonstrates how and when different senses translate into each other, following a specific pattern. Studying this pattern of intersensory relations (Howes, 2005) is conducive to understanding the role of the body in the process of musical learning. Finally, it demonstrates how intersensory learning gives access to musical knowledge and skills, such as rhythmic patterns, cohesion, form, melody, theory, chords and harmony. Answering the third question provides tools for music educators to adopt sensory learning in the classroom.

This research seeks to understand the role of the senses in musical leaning processes based on theoretical frameworks developed in the field of anthropology of the senses. In this study, not only ocular and auditory perception are considered, but kinaesthetic movement of the body is also under investigation. Since it is taken for granted that the eye, followed by the ear, plays a major role in music education, the use of other senses is relatively understudied (Bowman & Powell, 2007). Therefore, music transmission has usually been studied with an emphasis on vision and hearing, whereas the transmission process entails a more comprehensive set of sensory experiences, including kinaesthetic participation. These somatic sensations, which arise during musical interaction, will be scrutinized in this research.

Interest in the senses emerged within anthropological studies in the late eighties (Howes, 1991; Stoller, 1989; Classen, 1997). Anthropology of the senses studies sensory perception as a cultural and physical act. Consequently, the senses are not merely tools to perceive physical phenomena, but sensory experience also serves as a vehicle for transmitting culturally specific information (Classen, 1997). Through studying the senses, the researcher translates particular and culturally specific sensory perceptions into sensory models, subsequently making sense of the world (Classen, 1997). In other words, attending to the role of sensory modalities in society, the researcher collects essential clues about the organization of society and the ways in which meanings are conveyed through sensory interactions. Anthropology of the senses aims to overcome the ambiguous status of the senses as subjective tools of knowledge of one's reality (Hsu, 2008). Sensory perception is by no means merely a part of bodily experience, but rather the socially constructed foundation for our bodily experience of this world (Classen, 1997). Exchange and interaction with other bodies are conducive to the formation of meaning and are experienced through somatic modes of communication (Howes, 2005; Jackson, 1983).

For this study, I draw on two strands of anthropological approaches regarding the senses: anthropology of the senses (Howes & Classen, 1991) and sensory anthropology (Pink, 2009; Ingold, 2000). The first approach concerns a sensory analysis of cultural practices and is deeply rooted in ethnographic practices (Classen, 1997). The second, more contemporary strand is considered a "re-thought anthropology" based on theories outside anthropology on sensory perception (Pink, 2011). Both anthropological schools of thought inform this study, mainly through the work of Pink (2009) on

emplacement as a refinement of embodiment theories and Howes' intersensoriality (Howes, 2005; 2006; 2010). Howes' (2005) notion of sensual relations, which postulates that senses are placed in a hierarchical order depending on the activity and cultural context, is central to my analysis of the band rehearsals. Some music students prioritize hearing whereas others deploy sight or bodily movement for specific tasks. Often the senses are deployed at the same time, operating in harmony, confusion or conflict. Howes stresses that intersensoriality is by no means a sensory state of equality or harmony, but rather hierarchically ordered (Howes, 2006). Taking the intersensory merging of the senses into consideration will help to understand musical learning processes. Along these lines I argue that youngsters acquire musical knowledge by sensing the other, through a complex network of intersensory experiences following sensory sequences of auditory, kinaesthetic, and visual learning, through musical interaction with other bodies. Studying patterns of intersensory relations gives us access to how musicians learn to make sense of their musical world.

Theoretical background

Formal and progressive education

As long as there has been education, there have been disputes about the transmission of knowledge, the role of children in the learning process, and the definition of knowledge (Thomas, 2013). Interestingly, in the 4th century B.C., Aristotle already coined a relevant question for the present-day; whether the young should learn for the benefit of intellect rather than for personal development. He continued by contemplating whether education serves as a means to learn things useful in life, whether it is conducive to virtue, or whether it stimulates exceptional accomplishments. (Ackrill, 1988). During the historical development of thinking about education, we see the same questions appear over and over again, basically evolving into two streams of thought: the formal and the progressive. Generally speaking, formalists emphasize the top-down formation of knowledge. In this process, the teacher, as the beholder of knowledge, transmits specific chunks of knowledge in which the students need to immerse themselves. During history, formal education became the dominant stream of thought vis-à-vis which the progressive thinkers developed alternatives. The progressive stream of thought stresses the naturalness of learning; children have exploratory natures and learn all day. During the inductive process of learning, children discover knowledge through play and exploration. In the 18th century, thinkers such as Rousseau and Locke challenged the formalists by arguing that children are little scientists, empirically discovering the world by trial- and -error. Despite the endeavours of progressive scholars in the 20th century such as Plowden, Dewey, and Montessori to label the child as an exploring little scientist whose trial-and-error-thinking needs refinement, formal education, with its emphasis on cognitive learning, dominates the field of education to this day (Thomas, 2013).

The body and education

A body moves, explores, and learns by doing. As Montessori (1967) argues: "Watching a child makes it obvious that the development of his mind comes about through his movements… Mind and movement are part of the same entity." Decades later, Yang and Damasio (2007) highlight the connection between emotion, cognitive decision making, and social functioning in an empirical study demonstrating the essential role of the body in learning. Contemporary work on the role of the body and the senses in language comprehension demonstrates that embodied interventions enhance reading skills. In an experiment, young readers responded to a story through physical and imagined manipulation. The first group manipulated objects whilst reading a text, whereas the other group merely imagined the manipulation. The experiment revealed that requiring children to physically manipulate objects solidified the gain in recall and comprehension of language (Glenberg et al., 2004). Furthermore, mathematical learning became more informed by embodied approaches. In experimental settings, Cook et al. (2008) claim that a gestural approach to learning improves mathematical learning. Children who employed gestures whilst solving a mathematical equation were more likely to retain the knowledge than children who merely spoke, but did not gesture. More recently, Alibali & Nathan (2012) presented evidence pointing at the embodied nature of mathematical learning drawn from gestural communication between teachers and students. They argue that mathematical knowledge depends on perception and action and is grounded in the physical environment.

The aforementioned studies present an unequivocal result: embodied approaches to cognitive learning enhance the acquisition of knowledge and skills. These studies are exploratory and their findings have not yet trickled down to the classroom. As Glenberg stresses: "This work has yet to produce effective interventions" (Glenberg 2008: 370). Nonetheless, they put forward the importance of the body and the senses as an essential educational aid in the process of learning.

The senses in anthropology

The interest in the senses in the academic field has been instigated by anthropologists such as Howes (1991), Stoller (1989) and Classen (1997). Anthropology of the senses focuses on the human being as an actor within socio-cultural structures. It considers human beings as producers of sensory experiences and at the same time perceivers of these sensual products (van Ede, 2009). Scholars within this field study sensory perception as a cultural and physical act. Consequently, the senses are not merely tools to perceive physical phenomena, but sensory experience also serves as a vehicle for transmitting culturally specific information (Classen, 1997). Preferably, the researcher does not study the senses as distanced and objectified topics of research, but develops sensory models, translating particular and culturally specific sensory perceptions, in order to make sense of the world (Classen, 1997). The subjective status of sensory experience dates back to colonial expeditions in the 17th century, when Europeans measured the bodies of inhabitants of faraway countries and mapped the sensory acuity of the exotic other in an endeavour to constitute "themselves as rational Europeans and their subjects as sensuous savages" (Howes, 2003: 4).

The senses are not simply precultural "windows of the world", slavishly sending information to the brain to be processed objectively. Rather, following the prevailing idea that the human body is socially constructed, the senses are determined by external influences. Our senses are subject to social codes, constituting socially adequate sensory behaviour (Classen, 1997), ranging from the way we consume our meals to the way we deal with intimacy. Sensory perception, Classen (1997) continues, is by no means just a part of bodily experience, but rather the socially constructed foundation for our bodily experience of this world. Due to the culturally constructed nature of sensory experiences, they are, in fact, not automatically inscribed in the body. Assuming that the body is subject to culture and merely acted upon feeds into the primacy of the dominance of the mind over the body; the objective over the subjective (Hsu, 2008). Scholars such as Classen (1997), Hsu 2008, Howes (2005), Ewart (2007) and Alex (2008) share the ontological viewpoint that sensory experience is culturally specific and, even a step further, that the senses are "situation-specifically encoded" with intentionally deployed senses. A concrete example is Kondo's sensory symbolic analysis of a Japanese tea ceremony in which each sensory sequence is imbued with cultural significance and meaning to reach a state of silent contemplation and reflection. The participants in this tea ceremony convey meanings as they shift through different senses, going from odour to sound to silence and taste (Kondo 1983/2004). The premise of sensory intentionality is of great value to this study to understand the sensorial efforts of young musicians making sense of their musical world.

Another primary concern of anthropology of the senses is to challenge the Graeco-Roman hierarchy of sensory experiences, no longer valuing vision over touch and taste (Paterson, 2009). Ever since the eighteenth and nineteenth century, sight is considered the most precious sense. Knowledge can merely be obtained by vision, through the penetrating and enquiring *gaze* of the scientist (Foucault, 1975; Le Breton, 1990, cited in Classen, 1997). The credo "seeing is believing" (van Ede, 2009) fits the positivist scientific view of making the intangible tangible. In *Empire of the senses*, Howes (2005) questions the indisputable ocular paradigm of science by captiously posing an alternative to visual hegemony in scientific research. We are all familiar with the visual depictions of DNA, he argues, but we never wonder what it would taste like, or how it smells, let alone how it feels in our hands. This seems an odd question. However, many anthropological scholars came to question the seemingly unquestionable after discovering that the ocular way of knowing is by no means a universal phenomenon. Scholars such as Stoller (1989), Feld (1984), Schechner (2001), Howes (2003), Classen (1990, 1994, 1997), Pinard (1991), and Seremetakis (1994), elaborated on the role of the senses in ways of perceiving the world and argued that sensory experience is multifaceted and uniquely structured in various hierarchies across cultures. Some cultures go from tasting to moving, seeing, and hearing, back to tasting. Others prioritize smell, hearing or touch as a starting point to make sense of the world (Howes, 2003).

Derived from these studies, I question the prevailed way of musical knowing through the sensory experience of visual learning. Revisiting the piano classes I took as a child, I found myself learning notation before playing. This personal example reflects that music education proceeds by the dialectic in which music can be in the creator's mind or in the notation of it (Kleeman, 1985). As we go from intuitively exploring musical children to systematically ordering sounds into symbols, we tend to attribute tacit knowledge to symbols as if they are the real bearers of sound, while in reality notation is not more than a unit of description. By doing so, we wipe out the intuitive nature of a bodily feel for rhythmic flow and replace it with static cognitive knowledge (Bamberger, 1996).

Music learning, however, entails more than visual dependency on notation; it requires a moving and feeling body. Aside from kinaesthetic learning, hearing, and seeing, I consider touch as another essential sense conducive to musical learning. The body is in constant touch with the instrument. On a cutaneous level, the musicians feel the pressure of the fingers on the keys or the sharp strings almost cutting through the fingers while playing the guitar. The experience of touch is not the preserve of the blind alone, but "crucial to embodied existence" (Patterson, 2007: 1), and therefore essential to musical learning. Musicians literally need to embody the music by touching the instrument, subsequently connecting the body with the instrument as an extension of the self (Nijs & Leman, 2007), bringing the instrument as a lifeless object into proximity of the senses.

In this study, socially interactive, emotional, and social minded bodies are under investigation. Somatic patterns emerge in a habitus through interaction with other bodies and objects. In any given social and material space, bodies internalize specific knowledge and attribute meaning to interactions, in what Jackson describes as "reciprocal anthromorphism" (1983: 137). Exchange and interaction with other bodies are conducive to the formation of meaning and are experienced through somatic modes of communication (Howes, 2005). In order to link notions of human musical interaction, I will develop a sensory pathway. For this I borrow Howes' (2005) notion of sensual relations. His contribution on sensuous learning proves to be a solid base for this current research. According to Howes, senses translate into each other, apparently following a sequence. In daily life, humans perform certain rituals, moving from one sensory modality to another. Sometimes the senses work in harmony while at other times they are hierarchized or even conflict with each other (Pink & Howes, 2010). It stands to reason that young musicians acquire musical knowledge by sensing the other through a complex network of "intersensory" (Ibid.) experiences, that is, "the multi-directional interaction of the senses and of sensory ideologies" (Howes 2004: 9). They follow sensory sequences of auditory, kinaesthetic, and visual learning, through musical interaction with other bodies. Leman (2006) points out that we can only understand corporeal imitation by perceiving sensory systems as an integrated part of human interaction. Studying sequences of intersensory relations gives us access to how musicians learn to make sense of their musical world through bodily interaction.

As I already indicated in the introduction, this study is informed by 2 schools of thought: anthropology of the senses and sensory anthropology. The first strand "may provide a fruitful perspective from which to examine many different anthropological concerns" (Classen 1997: 409). Originally, it was concerned with sensory symbolism, but contemporary anthropology of the senses shifted towards an interest in sensory practices and experiences (Pink & Howes, 2010). The latter departs from anthropology of the senses, but emphasizes the importance of an interdisciplinary approach. In the words of Pink (2010: 331): "It is dependent on other disciplines for its foundational ideas". Informed by fields ranging from sociology to neurology, sensory anthropology offers insight in sensory practices and experiences. Rather than choosing sides in a heated, but highly entertaining debate between Pink and Howes (2010), I continue cherry picking useful tools for my study from each strand. I conclude this section with a final theoretical consideration in the spirit of sensory anthropology; crosscutting various disciplines. This allows me to contextualize the learning body through interaction with others in a specific environment.

Since the body is no longer considered a separate entity from the mind, rendering the Cartesian dualism obsolete, the notion of embodiment has entered the fields of sociology (Howes & Inglis, 2001; Turner, 1984; Shilling, 1993; Crossley, 1995), anthropology (Howes, 2003, 2005), and

musicology (Leman, 2008; Leman & Camurri, 2006; Bowman, 2004, 2007). Within the paradigm of embodiment, the body became a thinking and doing subject (Howes & Inglis, 2001) that learns through action. Knowing is not merely a cognitive endeavour: "…knowing is inseparable from action: knowing is doing, and always bears the body's imprint" (Bowman, 2004: 25).

Intersensory learning, however, does not only occur within the united bodies and minds of individual learners, but rather flourishes through interaction with other bodies and instruments, as extensions of those bodies. The theory of embodiment seems to fall short in this context. My research calls for another approach. Howes (2005) proposes to move from embodiment towards emplacement, suggesting the "sensuous interrelationship between body-mind-environment" (Howes, 2005:7). This theoretical triangle indicates the relationship between the body as a "material, physical and biological phenomenon" (Shilling, 2003:10) in constant negotiation with its environment. He continues: "Social relations may take up and transform our embodied capacities in all manner of ways, but they still have a basis in human bodies" (Shilling, 2003: 12). It is through external influences, such as social relations, that our embodied actions transform. While we interact with other bodies, we perceive the world through the action of movement, Ingold (2000) stresses. In furtherance of this analytical pathway, Downey (2005) analyses the body as inextricably interwoven with its environment. The body becomes an organism, not only acting or being acted upon in its environment, but the body itself becomes "simultaneously physically transformed as part of this process" (Pink, 2011: 347).

Pedagogical context

Considering the body as a changeable object, acting and being acted upon within its environment, has important implications for this study. I examine learning as an activity in which musicians not only embody musical information at an individual level, but rather learn through moving and perceiving bodies, interacting with others. This social constructivist view forms the pedagogical embedment of this study. Generally speaking, constructivism rejects the more traditional pedagogical approach in which the teacher holds the key to acquiring knowledge. Pedagogical reformers such as William James, John Dewey and development psychologists such as Jean Piaget and L.S. Vygotsky have had an incredible impact on the way teachers teach today. They challenged top down knowledge transmission based on classical stimulus response and reproductive knowledge recall with bottom up learning didactics in an environment where the view on learning is described as an accumulative process of building knowledge on already existing cognitive information (Burr, 2015; Taylor, 2014; Tynjälä, 1999).

The impact of constructivism and the emphasis on cognitive information in music education is unmistakably visible in the work of the influential music education researcher Edwin Gordon. He stresses that within this process of social interaction, cognitive knowledge building and language as a precondition for thought undoubtedly play an essential part in musical learning. He developed his theory on sequences in musical learning with an emphasis on musical meaning making as a pure cognitive undertaking. The endeavour of musical learning, coined "audiation" by Gordon (2007), is concerned with meaning making through cognitive processes, analogous to learning a language. Children process the meaning of individual words through aural perception even before they can form sentences. In a similar vein, musical learning commences with identification of musical patterns – as the smallest musical units, comparable to words - through understanding rather than sheer mechanical imitation of musical material. Gordon stresses that musical meaning works from the inside out: "Through the process of audiation, we sing and move in our minds, without needing to sing and move physically" (Gordon, 2007: 6). This widely supported theory amongst music educators sits within the prevailing paradigm of individual cognitive learning. Gordon's theoretical avenue leads towards the exclusion of the social and interactive body from the realm of knowledge building.

Social constructionism, an offshoot of constructivism, recognizes the process of individual knowledge construction, but stresses that individuals fabricate knowledge through social interaction with others (Burr, 2015). According to Gergen (1995), the construction of knowledge commences with communication by means of linguistic artefacts and verbal communication. It is thus the linguistic communal concern that defines social constructionism. As Burr (2015) articulates: "social constructionism argues that our ways of understanding the world do not come from objective reality but from other people, both past and present" (Burr, 2015: 10).

Musical learning requires more than the spoken word and cognitive processes, which serve as a framework for musical meaning making. As children prefer non-verbal modes of communication in the musical learning process (Barrett, 2005), I consider bodily communication the central learning tool in musical meaning making and performing. I argue that language plays a role in musical learning, but is often deployed to break the flow of playing. As I will demonstrate in the results section, the majority of corrections occur non-verbally, supported by gestures and kinaesthetic activities. Social constructionism highlights social interchange as a prerequisite for learning and therefore serves as a pedagogical framework for this study.

From embodiment to emplacement

Besides social bodily movement and physical interaction with others, the body acts within a specific environment, which has a transforming effect on the body. I borrow some relevant analytical tools from Pink's (2011) analysis on Spanish bullfights. She demonstrates how a shift from embodiment to emplacement is beneficial to understanding the moving and perceiving body as a part of the environment. Emplacement exceeds embodiment's dual relation between body and mind by implying a triangular relation between body-mind-environment (Howes, 2005). The body learns through movement and sensing the world, entangled with the environment, coined as "place event", consisting of objects, human socialities, and activities as a nexus of things (Pink, 2011). Applied to this research, I examine learning as emplacement, subdivided into two analytical tools. First, the place-event of learning. This is the practice room of a music school with objects such as instruments and amplifiers. In the context of this study I subsume the musical background of the students under the umbrella of human socialities. The way students practice and choose their music material hinges on learning experiences in the past. Finally, the activities consist of various ways of practicing or social relationships with peers or the teacher. These place-event activities are elaborately documented in the ethnographic transcripts. While place-event serves as a tool of analysis conducive to understanding and contextualizing how the body acts on others or is acted upon by human socialities, objects, and spatial constraints, the analysis of interaction provides us valuable information on the outcome of musical learning processes. Place-event and interaction combined, form the analytical lens of emplacement; the window through which we understand how students acquire musical skills in a broader cultural and material context. In the method section, I will elaborate on how the analysis of musical interaction during the learning process brings about knowledge on sensory learning.

Method

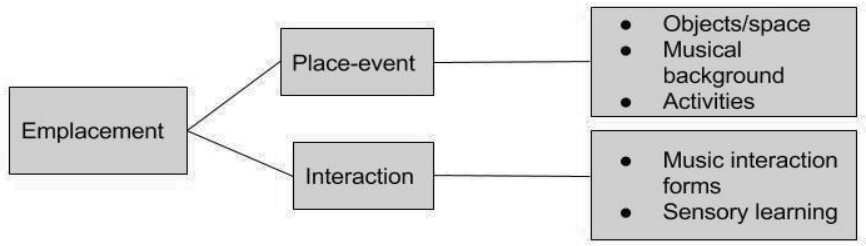
As a preparation for this ethnographic field study, I visited MuzyQ, a music centre with practice rooms in Amsterdam, the Netherlands. The motivation for choosing this practice space was based on the ample availability of a variety of bands and music styles. For this analysis, I selected three bands which I observed for a period of six months (from February until July 2013). I observed and recorded 32 rehearsals of 90 to 120 minutes, including 2 full days in the studio and 5 performances on stage. The rehearsals were recorded from various angles, aiming to grasp the bigger picture and to understand specific sequential particularities of musical learning. Two bands, DSOPM 1 and DSOPM 2[14] played rock and pop music, were part of a training program to prepare the students for auditions at conservatories or pop academies. The DSOPM ensembles consist of a drummer, two guitarists, a keyboard player, a bass player and two singers. The third band, *Moxi Delight,* played Afro-Caribbean music and jazz music with an emphasis on learning how to play solo's and how to create a unique Afro-Caribbean collective sound. This ensemble consists of three (alternately playing) drummers, a saxophone player, a keyboard player, a guitarist, a bass player, a violinist, and three singers.

The three bands invited me into their musical circle without hesitation. Wholeheartedly, the students shared their musical struggles and aspirations and wanted to know my opinion on their recording in the studio or the quality of their performances on stage. Especially, the band coach of Moxi Delight involved me in various musical projects of the band outside the weekly rehearsals, which enabled me to fully contextualize the musical learning process of the band members and the teaching methods of the band coach.

In congruence with the theoretical section, I divided the analysis in two sections: 1) The *place-event-analysis* in which I elaborately reported the context of learning based on video observations in a transcript. In these rich, descriptive reports I described the objects/space, musical background (previous musical training and aspirations) and activities (ways of practice and preparation for the band rehearsal) in great detail. 2) The *Interaction-analysis* in which I systematically analyse the interaction sequences and the sequences of sensory learning, how the senses merge, and what their relation is to musical knowledge and skills (see model 1 below).

[14] Dutch School of Popular Music. http://dsopm.nl/

Model 1. Emplacement



In addition, I conducted 3 focus group interviews with each separate band at the end of the rehearsal period. During these interviews, the students reflected on their musical background, conscious and unconscious deployment of the body, and musical interaction. Despite the intangible nature of conscious and unconscious learning, students were surprisingly able to reflect on their learning process.

Systematically analysing sensory interaction and exchange between social agents and coding this into a set of variables to discern regularities, brings knowledge on musical learning to the surface that would otherwise not have been accessible to the researcher. By doing so, the researcher is able to identify various degrees of intersensory learning objectively since musical interaction is embodied by the performers. The challenge lies in developing a method allowing the researcher to make implicit sensory learning explicit by demonstrating specific sequences in the process of musical learning.

To discern sequences of learning, I draw on findings of previous research on musical learning. In this study, I suggest that observation of bodily movements and interaction with other band members is essential in the music learning process. Knowing how to play a certain musical phrase at an individual level is one thing, but knowing how to play that same phrase collectively to create cohesion requires hours of observation and imitation of each other's bodily movements (Van den Dool, 2016). I selected four forms of interaction deployed during a band rehearsal: 1) Monitoring (observing other musicians' movements); 2) Imitation (imitating bodily movements, melodic phrases

and rhythmic patterns); 3) Confirmation (confirming well-played phrases, smooth transitions or gestures to express contentment); 4) Correction (evaluation and correcting of musical actions). During the learning process, students are likely to follow certain typical sequences, such as monitoring - imitation - confirmation - correcting - imitation.

In addition to the interaction classification above, I employ another set of variables to assess sequences of learning. Based on the ontological viewpoint that musical learning occurs through sensory interaction, I identified three sensory learning activities: visual, auditory, kinaesthetic. As stated in the theoretical framework, senses do not operate separately, but translate into each other, apparently following a sequence of sensory learning (Howes, 2005). Within this sequence, students place specific senses in a hierarchical order depending on the activity at hand. For the sake of clarity, I divided sensory learning in three separate activities to create measurable variables.

The analysis consists of three sensory practices: 1) Visual learning entails looking at teachers' or peers' movements or gazing upon sheet music. 2) Auditory learning encompasses listening to recordings or music examples played by peers or teachers. Given the default nature of aurality - after all we do not shut down our ears whilst playing music - I only coded conscious and visible aural activities. For example, a student turning his or her head away from the circle to fully concentrate on the sound he or she produces or stops playing after a mistake to consciously concentrate on the right musical information, are coded as auditory activities. Other than that, aurality is constantly present. 3) Kinaesthetic learning involves corporeal dimensions, developed through experience and playing. This type of learning also includes tactile learning. (Bowman, 2004; Barret, 2005). Kinaesthesia also relates to sensations originating in muscles and the movement of the body and limbs. (Paterson, 2007). In light of this study, I quantified all synchronous and a-synchronous bodily movements in relation to sound, that is, tapping a foot, clapping hands, swaying bodies or head moving on the pulse.

In preparation for the interaction analysis, I coded the transcripts by labelling each musical activity with the two aforementioned sets of independent variables. The first set consists of musical interaction variables: confirmation, correcting, monitoring, and imitation. The second set consists of sensory learning variables: auditory, visual, and kinaesthetic learning. The final set is comprised of musical skills, the acquisition of which can be related to the independent variables. These skills are: chords/harmony, cohesion, form, melodic patterns, rhythmic patterns, and tempo. They are the dependent variables in the analyses. The former two sets of variables represent the input (bodily interactive activities by the band members) that possibly affects the acquisition of musical knowledge.

To substantiate claims on the acquisition of musical knowledge and skills, I analysed specific relations between forms of musical interaction and sensory learning on the one hand and acquisition

of musical knowledge on the other hand. For this analysis, I systematically analysed 751 video clips using *Transana Professional 2.60* (Woods, 2009). The length of the clips varies from 7 seconds to 1:19 with a total time of 6:22:50. Transana is a qualitative video analysis software program that allowed me to present data in keyword sequence maps, showing interaction sequences during a band practice. I determined the length of each clip based on short learning cycles in which the students deploy specific forms of interaction and sensory tools to acquire a musical skill. As demonstrated in the clip summary below, the bulk of time is allocated to attempts to acquire musical skills. It goes without saying that the numbers of successful acquisition is significantly lower than the number of deployed sensory interactions.

Complete clip Summary		
Musical interaction : Confirmation	279	2:06:24.3
Musical interaction : Correcting	259	2:05:22.9
Musical interaction : Imitation	163	1:13:22.0
Musical interaction : Monitoring	510	4:07:50.9
sensory model : Auditory	481	3:56:20.6
sensory model : kinaesthetic	556	4:20:12.5
sensory model : visual	507	3:55:51.8
outcome variables : Acquisition of chords/harmony	29	0:11:01.8
outcome variables : Acquisition of cohesion	100	0:46:00.4
outcome variables : Acquisition of form	40	0:18:01.0
outcome variables : Acquisition of melodic pattern	28	0:11:05.5
outcome variables : Acquisition of rhythmic patter	55	0:21:04.6
outcome variables : Acquisition of tempo	9	0:03:48.1
Clips: 751	Total Time:	6:22:50.6

Each clip either contains a successful or unsuccessful attempt to acquire a musical skill. A successful attempt starts with a set of sensory interaction forms and ends with the acquisition of a musical skill (see episode report *Rehearsal 1 part 4* below). First, the student (keys player) deploys a series of sensory interaction forms after detecting a mistake. Correcting the mistake with visual focus and kinaesthetic involvement leads towards the acquisition of a rhythmic pattern. This occurrence determined the end of the clip.

Episode Report: Rehearsal 1 part 4 Quick Clip 16

Collection: Quick Clips
File: C:\Users\jaco\Videos\Moxi delight\Rehearsal 1\MOV041-Analysis.mp4
Time: 0:07:54.7 - 0:08:07.8 (**Length:** 0:00:13.1)
Series: Moxi delight
Episode: Rehearsal 1 part 4
Episode Transcript: rehearsal 1 part 3
Clip Transcript:
Keys turns his head slightly to guitar (listens) because guitar
doesn't play the variation of the chord, he emphasises the last rhythmic variation.
Guitar looks up, moves stronger with his head on the beat,
looks up after every motif to check with keys. He plays the correct rhythmic pattern.
Clip Keywords:
Musical interaction : Confirmation
Musical interaction : Correcting
Musical interaction : Imitation
Musical interaction : Monitoring
sensory model : Auditory
sensory model : kinaesthetic
sensory model : visual
Outcome variables : Acquisition of rhythmic patterns

Clips in which the students unsuccessfully attempts to acquire musical skills start with a series of sensory interaction forms leading towards skill mastery. For example, in the episode report below the singer makes a mistake. This determined the beginning of the clip. After the corrective move of the teacher, the student fails to correctly imitate the teacher. This forms the end of the clip.

Episode Report: Rehearsal 2 part 2 Quick Clip 5

Collection: Quick Clips
File: C:\Users\jaco\Videos\Moxi delight\Rehearsal 2\MOV03D-Analysis.mp4
Time: 0:01:09.4 - 0:01:30.4 (**Length:** 0:00:21.0)
Series: Moxi delight
Episode: Rehearsal 2 part 2
Episode Transcript: Rehearsal 2 part 2
Clip Transcript:
Singer misses the first high note- teacher sings the first descending phrase
and emphasizes the first note with a head nod- singer imitates, but fails.
Clip Keywords:
Musical interaction : Correcting
Musical interaction : Imitation
sensory model : Auditory

The interaction analysis enabled me to answer the first part of my three-fold sub question: *Which interaction sequences and sequences of sensory learning do band members follow during a rehearsal?* By answering this research question, I created a clear overview of sequences of learning through interaction and sensory learning, depicted in the various models in the result section. I compared the various sequences the students followed by focusing on the order of musical interaction and sensory perception during a sequence. For example, a possible sequence consists of correcting a peer through synchronous tapping, upon which another student simultaneously looks and listen, followed by imitation coupled with kinaesthetic movements. I studied with which interaction form and sensory tool a sequence started, which ones followed, and how it ended. By comparing the order of forms of interaction and sensory perception within a designated set of sequences, data emerged about specific forms of interaction and the deployment of sensory tools related to obtaining music skills.

The second aim of this study was to investigate when and how the senses merge and in which cases certain senses were prioritized in the learning process. First, I analysed at which moment in the learning sequence specific sensory tools were deployed. I grouped the senses within the learning sequences with the interaction forms, demonstrating when during the interaction process students mobilize certain sensory tools. Second, I analysed the merging process of the senses by demonstrating how the students mobilize and prioritize specific senses. For example, for learning a melody students prioritize auditory focus followed by visual contact, whereas rhythm acquisition requires a merged deployment of auditory and visual monitoring immediately followed by kinaesthetic imitation. To elaborate, students tend to prioritize certain sensory activities, putting the senses in a hierarchical order. Scrutinizing this hierarchy is conducive to understanding the connection between forms of musical interaction and specific sensory activities.

In pursuit of answering the third sub question, aimed at demonstrating how intersensory learning provides access to musical knowledge and skills, I analysed the musical interaction and sensory learning sequence related to acquiring musical knowledge and skills. The relation between four forms of interaction, three forms of sensory activities, and musical knowledge and skills, i.e., rhythmic patterns, cohesion, form, melody, theory, chords and harmony, were central to the analysis. These musical parameters were selected based on previous research on musical learning in band formations in which they proved to play an essential role in successful playing and learning (Van den Dool, 2016)**.** By analysing the sequence maps in *Transana*, showing specific sequences of musical interaction and sensory activities, I was able to see the relation between interaction and sensory learning on the one hand and musical skills and knowledge on the other.

In order to substantiate claims on the relation between musical interaction, sensory learning, and the acquisition of musical knowledge and skills, I analysed the relation between the dependent

and independent variables in SPSS. The associations between musical communication and sensory activities on the one hand and musical knowledge on the other, can be probed by using a cross tabulation analysis. This quantitative analysis allows for analysing the possible relationship between two variables. The crosstabs, presented in the result section display the joint distribution of two assigned variables, analysing the possible relationship between dependent and independent variables on the level of either each individual band or the complete data set. The data consists of: Moxi Delight (397 clips), DSOPM 1 (114 clips), and DSOPM 2 (240 clips), with a total number of 751 clips. First, I present possible relations between dependent and independent variables within the complete data set, followed by an analysis on the possible differences and similarities between the three bands. The cross tabulation analysis enabled me to assess which (combinations of) aspects of musical communication and sensory learning were likely to increase the chance of musical skill acquisition. For example, imitation increased the chance of mastering rhythm, as the latter was significantly more prevalent when imitation took place (12.3%) than when imitation was absent (4.6%).

Finally, I collected the various connections and outcomes of each individual sequence and searched for recurring patterns within the collected sequences. Comparing the sequential order of learning and searching for overlapping sensory activities within the complete set of sequential models elicited essential information on recurring patterns of learning. By doing so, I was able to present generic sequences of learning, demonstrating the order of musical interaction and sensory involvement. After that, I analysed how the senses merged within the generic sequences, explaining how and when students prioritize specific sensory activities. In the final step, I analysed overlapping elements within the interaction analysis and the generic sequences, bringing recurring links between musical interaction, sensory learning, and musical knowledge and skills in general, to the surface.

Results

In this section, I will present the results of the interaction sequence and the sensory learning sequence linked to each of the five dependent variables. First, I describe the place-event of the individual bands. Based on the interviews, I contextualize the ecology of learning by elaborating on objects/space, musical background and the activities (ways of practicing and preparation for the band rehearsal). Second, I discuss the results of the crosstabs analysis, by presenting the relation between musical interaction and musical knowledge in a series of tables. Building on this information, I describe which musical interaction and sensory activities students deploy, which senses they prioritize and how these sensory activities merge during the learning process. I present each sensory learning and interaction sequence in a sequence model as a visual summary in conclusion of each analysis.

Place event analysis

Every Saturday MuzyQ in Amsterdam attracts hundreds of young musicians. Some aspire a glorious music career, while others join their weekly classes mostly for sheer fun and social interaction. The building hosts several music entrepreneurs and organizations offering band classes and individual music training. According to their website, MuzyQ is the "largest music production center in Europe" (MuzyQ, 2016). They offer a variety of music classes in specific studios with the right acoustics for various music genres. One of the leading educational organizations within MuzyQ is *Dutch School of Popular Music* (DSOPM). They offer weekly individual instrument classes and music theory classes coupled with band classes on Saturday. During these 90 to 120 minutes band classes, students bring their individually developed music skill set in a collective practice under the guidance of certified coaches. A constant factor for both DSOPM bands, however, is the rehearsal space and placement of the students. Both bands practice in a circle, which allows for constant visual contact with all band members. The studios are spacious and fully furnished with amplifiers, drum set, and even a couch for students to relax on.

Central to the second part of the place-event analysis is the musical background of the musicians. Both DSOPM bands show some interesting overlap. All respondents were participating in pop bands before joining DSOPM. However, due to lack of supervision and coaching, these bands did not meet their expectations of musical growth. The same applied for their individual (instrument) classes: a mere 25 minutes of playing simple songs from staff notation with a teacher was utterly demotivating. They needed interaction with peers and guidance from certified coaches. All respondents expressed that DSOPM was a perfect match because of its unique program, offering

individual classes which are directly connected with the collective band classes. The musical material they learn during individual classes is part of the collective repertoire. Contrary to previous music education, this connective approach is perceived by the students as a logical whole. Subsequently, combined with weekly theory classes, the respondents connect the musical dots. Some students aspire to become a professional musician and see DSOPM as a stepping stone for the conservatory. The singer of DSOPM1 explains why she choose DSOPM as a preparatory year after having been rejected for the Herman Brood Music Academy: “After the audition for Herman Brood the committee said they saw potential in me. They advised me to work very hard on my musical skills with other musicians […]. Hence, I ended up here at MuzyQ and saw a flyer of DSOPM. I didn’t know whether it would meet my expectation. I just did it. It happened to be the best musical year of my life.” The band members from both bands either aspire to enter a professional career or develop their musical skills as a very serious hobby. Aside from the overlap mentioned above, the age composition and skill level differ slightly. The students from DSOPM1 are somewhat older, ranging from 19 to 24 years old. Whereas DSOPM2 consists of a wider age range, from 15 to 22. Consequently, DSOPM1 students require less guidance than DSOPM2 due to longer musical training.

The activities, or nexus of events, form the final part of this analysis. As said, the students from both bands visit MuzyQ on a weekly basis to rehearse for 90 to 120 minutes under the guidance of a coach. Every individual student receives systematic feedback on their musical development through the A-MACK system, developed by Jack Pisters (2012). According to his website, this acronym stands for Attitude-Motoric skills-Auditory skills-Creative skills-Knowledge skills. A-MACK is a student tracking system, providing teachers and students learning and teaching tools to develop these skills. Concerning the teaching method, the band coaches of DSOPM tend to apply a pedagogy of collective exploratory learning. In other words, the students are encouraged to filter out specific mistakes and collaborate to solve musical problems. During, the rehearsals, I seldom observed a coach telling exactly what and how to play. In this social constructivist learning environment, the students are expected to find their own way. At first, students perceive this pedagogy with reservation. The lead singer comments: “This music school (DSOPM) is rather unorganized. However, we have a very close connection with each other”. The band members confirm that the pedagogical approach of DSOPM feeds into a self-directed form of learning, in which students feel the freedom to constructively offer feedback and evaluate their collective performances with an utmost critical view. Interestingly, the students are, aside from the standard repertoire, required to collectively compose new pop songs. Alternately, each band member presents a framework for a song, consisting of a melody and chords. The lead singer explains how she composes her songs: “I don’t have much chord knowledge. I just search for half an hour by randomly placing my fingers and then suddenly I find a chord to my liking.”

Despite students attending weekly theory classes, composing a song seems predominantly built on intuitive, auditory reflection rather than theoretical knowledge. In a collective endeavour, the band members build their material gradually by first playing and then discussing the result. Upon their democratic discussion, they approve or reject the material. These rehearsals have the character of a jam session where the band coach only steps in when the creative process stagnates. Rather than depending on the coach's musical opinion, DSOPM1 students tend to limit discussion time. This is primarily the result of strong leadership, employed by the lead guitarist. DSOPM2 relies more on active guidance from the coach. Often there is discussion and the decision making process stagnates due to lack of leadership.

The final band of this place-event-analysis is Moxi Delight, an initiative of Multi Origin Music Activation (MMA). This foundation is committed to promoting the development of Afro-Caribbean music, like kaseko, R&B, reggae, zouk, gospel, funk, kawina, tumba, and jazz. According to their website, "MMA offers a sustainable and qualitative basis for creative music education in which theory and practice go hand in hand" (MMA, 2016). MMA does not offer private classes, but weekly workshop sessions instead under the guidance of a professional music coach for children, teenagers, and adults. In addition to the workshops, MMA fosters musical growth by organizing performances in which the students demonstrate their musical skills and music exchange programs with musicians from Brazil, Mali and the United States. During these exchange programs, students widen their cultural horizon through encountering novel musics and learning strategies.

Moxi Delight, the culturally diverse teenager band of MMA, practices in an identical studio as DSOPM in MuziQ on a weekly basis for 2 hours. As mentioned earlier, besides regular band musicians such as guitarists and drummers, Moxi Delight consists of two acoustic instrumentalists, including a violinist and a saxophonist. Because of the acoustic nature of these instruments, they need an extra set of microphones to amplify the sound. Consequently, the setup of the band is identical every week; every band member is assigned to an amplifier or microphone. The objects are set up in a circle, providing the students with a constant visual focus on their peers and the coach. To embody this collective learning experience, the band members form a circle, allowing for the singers to keep a constant gaze on the instrumentalists and, more importantly, the band coach. With a confirmative look at the band coach, the singer clarifies: "Robin [band coach] composes the arrangements, so he obviously knows best […] I mostly focus on Robin, so I know where to start." Besides this weekly practice in MuziQ, they spend time in a studio, recording the practiced material after a series of classes. In this space, they record the repertoire in smaller band sections behind soundproof windows, facing the sound engineer.

The musical background of the students differs as much as the variety of instruments. At the time of this study, the pianist and the guitarist were enrolled in their second year at the conservatory

of Utrecht. The singers, bass player, violinist, saxophonist and 2 drummers had no aspiration of becoming a professional musician and joined this band project for personal musical growth and interest in Afro-Caribbean music. Based on weekly observations, the bass player demonstrated an impressive skill set on his instrument, acquired during previous band practice in an evangelical church. Interestingly, the saxophone player showed an odd interest in music theory and had the tendency to explain individual or collective musical parts through theoretical concepts. In a later stage during this study, the coach introduced a third drummer, mainly playing more complicated jazz compositions. During the fieldwork, the drummer participated in Moxi Delight to prepare for his auditions. He currently studies at Amsterdam conservatory.

Finally, the activities deployed during the weekly rehearsals consist of practicing fixed repertoire, presented by the coach. Through active guidance of the coach, students learn to listen to each other and anticipate on the musical decisions of their co-players. During group improvisations the students discover the musical possibilities within a chord progression and apply their theoretical knowledge while playing. By doing so, the emphasis is on musical experience and performance rather than musical knowledge. The band coach succinctly explains: "The eclectic Afro-Caribbean music lends itself eminently for a collective music experience" (Robin van Geerke, PC 20-07-2013). The role of the coach as active leader subsequently induces increased dependence from the students on the coaches' non-verbal musical communication. Eventually, they work towards biannual performances in a theater, independently demonstrating their gained musical skills without the visual presence of the coach.

Interaction analysis

In the crosstabs below I present the associations between interactive sensory activities and musical skill acquisition. The columns contain an independent variables (interaction or senses) and the rows present a dependent variables (musical skills). I used a Chi Square-test to test the relations between musical interaction and the acquisition of musical skills. Based on the level of significance, I either present variable relationships for all bands or separate bands. Presenting all bands allows me to analyse the relationships across all 751 clips. Separating the data in individual band units allows for comparing the differences between the three bands. As indicated in the place-event analysis, the bands have different levels of musical proficiency and vary in the level of teacher involvement. Often only one band showed a significant relationship. By presenting the different levels of significance, analysing the success level of specific variable combinations, and drawing on the place-event analysis, I was able to make sense of the numeric differences between the individual bands.

Acquisition of chords and harmony

The crosstabs analysis indicates that confirmation ($p<0.001$) had a significant effect on the acquisition of chords and harmony (Table 1). The crosstab below shows a total count of 751 clips, 293 of which involve confirmation and 458 do not involve confirmation. The band members acquired chords/harmony 15 times without confirmation while 26 chords/harmony acquisitions occurred in combination with confirmation. In case of no confirmation there is 3.3 % change of mastering chords and harmony against a 8.9 % chance with confirmation. In other words, there is an almost three times higher chance of acquiring chords/harmony with confirmation than without deploying confirmation. This conclusion seems tautological at first and begs the question if confirmation as such is directly related to chords mastery. If confirmation is a mere confirmative token after success, how can it bear a positive effect on chords and harmony master? Note, however, that confirmation is more than nodding or a thumbs up as an affirmation of their musical choices at the end of a learning sequence. In the context of this study, confirmation is a continuous process of staying in tune with the music during the whole learning process. For that, students deploy their senses to feel, hear and see every musical choice they make. This continued interplay of the senses as a tools for confirmation was detected by the researcher in multifaceted ways; head down to fully concentrate on the sound; actively involving the body as a rhythm indicator; observing a peer or teacher to synchronize their bodies on the beat. These are all examples of sequential and ongoing forms of confirmation.

Tabel 1.

		Confirmation	
		All bands	
		No	Yes
Chords/Harmony	No	443	267
		96,7%	91,1%
	Yes	15	26
		3,3%	8,9%
Total		458	293
		100%	100%
Sig.		p= .001	

Derived from the interviews and observations, I found a recurring pattern of students deploying specific sensory tools to confirm chords and harmony. First, acquisition of chords and harmony requires a constant level of auditory alertness. As the keyboard player of DSOPM2 puts it: "Auditory focus is a constant factor [...] Things that need to be synchronized or which can easily vary can't fully rely on mere listening because it changes so quickly. As soon as you consciously focus on it, then you are usually too late." Besides auditory vigilance to confirm harmonic synchrony, students deploy visual contact to confirm complex harmonic changes. The lead singer exemplifies: "You motivate each other. For example, with three or four voicings you look at each other…If you focus on each other and you hear that you have the right voice then I feel: yes!" Apart from auditory and visual focus to confirm the right voicing, a gaze can also motivate students in their learning process.

When the data are analysed separately per band, table 1a demonstrates significant differences between the bands in regard to the role of confirmation in the learning process. Interestingly, for DSOPM2 confirmation renders a chance of 16% to acquire chords/harmony compared to a significantly lower probability of 3.7% when there is no confirmation. In comparison, DSOPM1 and Moxi Delight show very marginal differences in chord acquisition with and without confirmation.

Table 1a.

		Confirmation		**Confirmation**		**Confirmation**	
		DSOPM1		DSOPM2		Moxi Delight	
		No	Yes	No	Yes	No	Yes
Chords/harmony	No	52	61	129	89	262	117
		100%	84%	96,3%	84%	96,5%	96,0%
	Yes	0	1	5	17	10	8
		0,0%	1,6%	3,7%	16%	3,7%	4,9%
Total		52	62	134	106	272	283
		100%	100%	100%	100%	100%	100%
Sig.		p= .358		p= .001		p= .226	

A possible explanation for the significant impact of confirmation on chord mastery by band members of DSOPM2 only, can be found in the place-event analysis. Age and musical training differ greatly between the band members and seem to affect musical trust. Throughout the rehearsals, the band members of DSOPM2 strongly depend on confirmation with other band members. Especially repairing a mistake requires sensory vigilance. This is evident in the episode reports below in two different ways. First, the student in rehearsal 3 part 1 deploys confirmation in the form of auditory and visual confirmation. The latter serves as a final check with which the students confirm the status

of their repair; did I play the right chords? By not relying on auditory information and double checking their repair with visual information, the students display insecurity.

Second, rehearsal 4 part 1 includes kinaesthetic learning. As we can see in the episode report below, visual and auditory confirmation is used to repair the mistake. This provides them with sufficient information on how to overcome specific mistakes. Besides visual and auditory confirmation that contribute to repairing specific mistakes, kinaesthetic involvement serves as a final token of confirmation. By moving the body on the beat after repairing a mistake, students of DSOPM2 incorporate the musical vocabulary in their playing bodies. This leads to mastery of chords for less advanced players.

The argument I advance demonstrates the importance of multisensory learning with an emphasis on kinaesthetic involvement for beginners level students. It appears that DSOPM1 and Moxi Delight, performing on a higher level, evidently relied less on confirmation.

Episode Report: Rehearsal 4 part 1

Collection: Quick Clips
File: C:\Users\jaco\Videos\DSOPM period 2\10-6 dsopm\MOV001-Analysis.mp4
Time: 0:14:36.2 - 0:15:06.4 (**Length:** 0:00:30.2)
Series: DSOPM2
Episode: Rehearsal 4 part 1
Episode Transcript: Rehearsal 4 part 1
Clip Transcript:
Singer 2 finger clicks on the 8th notes, visual confirmation by looking at guitar,
then back to mic- singer 2 head down and listens.
Then looks at singer 2. Too late with start- singer 2 moves his body
strongly on the beat with finger clicks.
He bends down to listen- singer 1 too early with pattern-
singer 2 corrects her by head nodding, while moving on the beat.
Then he steps forward while keeping visual contact-
singer 1 confirms with bodily movements on the beat.
Clip Keywords:
Musical interaction : Confirmation
Musical interaction : Correcting
Musical interaction : Monitoring
sensory model : Auditory
sensory model : kinaesthetic
sensory model : visual

From the analysis, I draw one more significant relation in table 1b. Students from DSOPM 2 had a significantly increased chance of mastering chords/harmony while deploying kinaesthetic

involvement. Acquiring chords/harmony has a likelihood of 11.1% when it is accompanied with kinaesthetic involvement and of only 1.9% without it (see table 1b). Students from DSOPM 1 achieved chords/harmony 1 time with kinaesthetic involvement and 0 times without. These numbers are, however, not significant since kinaesthetic involvement only occurred once. More interesting is the comparison between Moxi Delight and DSOPM2. For DSOPM2 students, chords and harmony mastery in combination is 6 times more likely to happen with kinaesthetic movement than without, while this ratio is only 1.4 for Moxi Delight students. This difference requires further explanation.

Table 1b.

		Kinaesthetic**		**Kinaesthetic****		**Kinaesthetic****	
		DSOPM1		DSOPM2		Moxi Delight	
		No	Yes	No	Yes	No	Yes
Chords/harmony	No	15	98	50	168	110	269
		100%	99%	98,1%	88,9%	96,5%	95,1%
	Yes	0	1	0	21	4	14
		0%	1,0%	1,9%	11,1%	3,5%	4,9%
Total		15	99	51	189	114	283
		100%	100%	100%	100%	100%	100%
Sig.		p=.696		p=.044		p=.533	

The significant relation between chords/harmony and kinaesthetic involvement for DSOPM2 can be explained by extrapolating data from the place-event-analysis and linking it with the way these band members deploy musical interaction. In comparison with DSOPM1, the place-event analysis of DSOPM2 shows an increased level of sensory focus while disentangling musical problems throughout the rehearsal. This is largely due to their lesser musical training, which feeds into certain insecurities regarding chords and harmony. According to the students of DSOPM2, they often seek confirmation on acquiring harmony. For that, the students focus on specific interaction particularities with their co-students, subsequently building a network. To exemplify, singers first seek visual and auditory confirmation for acquiring the right harmony. As explained before, they seek visual confirmation for three or four voicing chords. Build on this information, students employ kinaesthetic involvement. Another singer from DSOPM2 succinctly explains: “You support and invite each other with your movements.” The latter seamlessly connects with the data from the clips and fieldwork notes. As soon as the students reach a complex level of harmony (three or four voicing), they first deploy visual focus, followed by isolated auditory focus. The episode report of rehearsal 4 part 3 below describes this process:

> Singer 2 tries to find a voicing. He observes singer 1. During the 2nd line he looks straight ahead and tilts his head slightly to listen to a fitting melody while trying a few notes.

Upon this auditory and visual information, students build kinaesthetic movements to synchronize the body with the harmony. The episode report of rehearsal 5 part 2 below describes:

> Singer 1 confirms start by looking at singer 2 in the break. Singer 2 moves on the beat as a preparation for his part of the song.

Built on this embodied knowledge, students observe kinaesthetic information from peers to evaluate and confirm. Having processed this information, they imitate the movements by emphasizing the harmonic contour of a chord progression. We can see this phenomenon in rehearsal 5 part 3:

> Singer 1 moves her hand in sync with descending line- singer 2 observes her movements and sings a parallel line. During singing, he emphasizes the first note of each descending pattern with his hands. By doing so, he acquires the right voicing.

In sum, DSOPM2 students follow a pattern in which visual and auditory information precede conscious bodily involvement. Especially imitation of kinaesthetic information from peers, bodily preparation and emphasis of certain notes, finally lead to successfully mastering chords and harmony. Interestingly, DSOPM2 students tend to depend to a larger degree on their peers' kinaesthetic information when it comes to harmonic acquisition than the other bands. A likely explanation emerging from the place-event analysis is the fact that the students have less musical experience than DSOPM1 and Moxi Delight. More than the other bands, they need to focus on kinaesthetic information before exhibiting the acquired musical information with embodied involvement.

According to the statistical analysis, a significant relation was detected between confirmation and kinaesthetic involvement and acquisition of chords and harmony. Based on the comparison of the sequences deployed to acquire chords and harmony, I present two dominant sequences derived from the analysis of the episode reports. One sequence starts with confirmation and the second with correcting. In both sequences, kinaesthetic involvement plays a central role in the learning process.

During the band rehearsal, teachers or peers first confirm how and what they need to play by deploying a kinaesthetic activity by synchronized shoulder movements on the beat. Based on the transcripts, teachers monitor the students, name chords or point with fingers to confirm the start of

a chord progression. This is followed by pantomimic movements of the teacher in conjunction with the movement of the chord progression. The recipient, in turn, first monitors the kinaesthetic movement of the teacher or peer and confirms the rhythm or harmonic movement of a chord progression by synchronized shoulder movements or a swaying of the body to the development of the chord progression. In most cases this form of kinaesthetic confirmation of acquiring the chord progression is expressed through regular foot tapping on the beat. A variation on this sequence starts with confirmation by listening first. In video 1, we can see that the singer confirms his voicing by auditory focus. Subsequently, he observes the keyboard player for visual confirmation on the right beat. He finalizes this sequence by consciously synchronizing his body with the beat, preparing himself for the right voicing with the harmony. The conscious involvement of the body in the form of preparatory tapping seems to play a decisive role in the learning process.

Video 1: Confirmation Sequence[15]

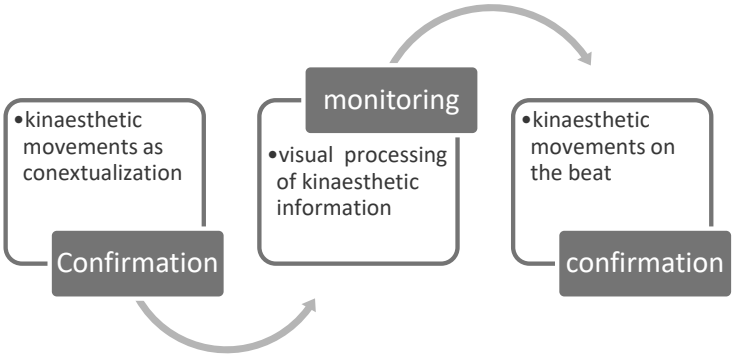
According to the singer of DSOPM 1: "When I clap with my hands, I feel the rhythm within me […] I do that to join the music. This is very conscious. Some moments I clap to prepare myself for a difficult timing. To completely feel the music, I start to tap with my feet and the rest follows accordingly." Interestingly, conscious tapping serves as a preparatory beat marker to embody the musical structure before actual playing. In chapter 2 of this dissertation I already discussed how observation always involves motor imagery and is therefore thoroughly embodied (Cox, 2011). Even without active movement, humans are capable of experiencing specific motor representations of observed actions (Calvo-Merino et al., 2005). In furtherance of these findings, I consider active foot tapping an intermediary phase between motor imagery and actual playing. In this in-betweenness, students prepare their bodies before actual music performance. The keyboard player of DSOPM 1 explains this important conscious exertion with surprisingly effortless reflection: "moving [on the beat] is a very conscious process. It does not just happen. If I do not actively think about it, my body does not move perfectly in sync. I had to teach myself to move in synchronization with the music." Apparently, synchronized movements are not completely default, but require preparation and practice. In sum,

[15] Click on the hyperlink or scan the QR-code for the video

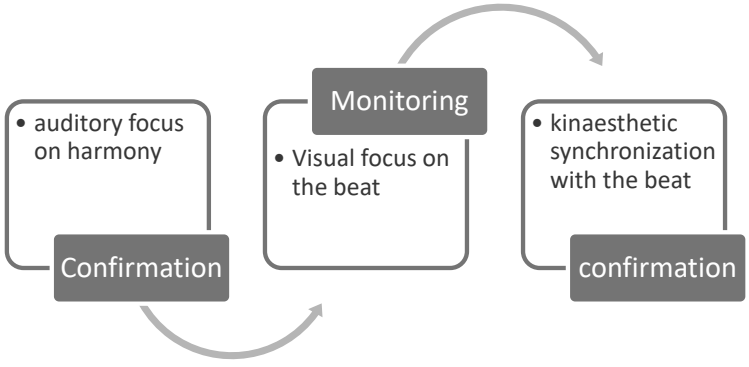
conscious tapping has a twofold effect: 1) it functions as a bodily preparation for the beat; 2) bodily synchronization with the beat contributes to music acquisition in general.

Summarized, confirmation in the form of kinaesthetic movements as a start of the sequence serves as a contextualization for the students of what and how to play or sing. Each sequence concludes with confirmation in the form of kinaesthetic movements such as foot tapping, demonstrating complete understanding and acquisition of the musical material. In the first sequence (see sequence 1) the students clearly prioritize observation of kinaesthetic movements. In the variation sequence, students give way to listening to identify their own voice in the collective harmony, but always followed by visual confirmation (see sequence 2).

Confirmation sequence 1:



Confirmation sequence 2:



The second form of musical interaction that plays a role in the learning process of chords and harmony is shown in the correcting-sequence. As suggested in the quantitative analysis, kinaesthetic

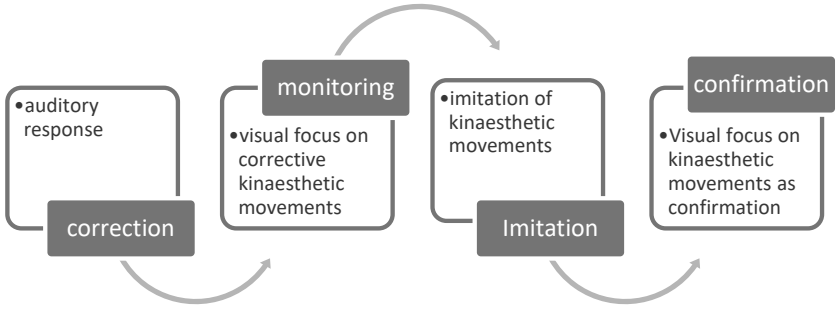
involvement forms the tipping point in the learning sequence. Comparing the sequences, confirmation is almost invariably followed by listening (auditory) and monitoring. To exemplify, in video 2 the guitarist plays the concluding chord progression for the pianist. The transmission of musical information starts auditory. The pianist listens, head down, and immediately after attempts to play the progression on the piano. The guitarist simulates the chords with his hands. Thus, drawing the attention of the pianist, who then monitors the movements and acquires the right chord progression.

Video 2: Correction Sequence

In the following example, the pianist plays the harmony for the vocal introduction of the singers. Vocalist 2 listens to the harmony, hums along, and moves her head on the accents. The teacher exaggerates the rhythm and right before the end of the rest he moves his body up and goes down in synchrony with the chords. The bass player closely observes the teacher. He is not sure when to start the sequence. During the first note he listens and observes. Then he immediately makes strong movements with his upper body in line with the sequence.

These examples represent a pervasive sequence throughout the whole dataset on acquiring chords and harmony: after correction by a teacher or peer, students listen to the right musical material, then monitor kinaesthetic corrective activities, such as pantomiming chord movements, followed by imitation, always supported by head movements or tapping feet on a regular beat, concluded by visual contact to confirm the right chord progression. In sum, the sequence starts with a recurring combination of correction, an auditory response and immediate monitoring of the corrective kinaesthetic movements. The students prioritize listening over looking to identify the mistake. In the next phase they observe first and then imitate the kinaesthetic movements of the teacher or peer. In the final phase, students use observation of the teacher as a tool to check whether they play the right chord progression. This combination of steps in the correcting sequence enables the students to acquire chords and harmony:

Correction sequence:



Acquisition of cohesion

In this section, I am interested in the acquisition process of cohesion and the role of sensory and musical interactions therein. In the crosstab analysis, three sensory independent variables show a significant relation with the acquisition of cohesion. Both auditory and kinaesthetic attain a convincing significance ($p<0.00$), followed by visual ($p<0.003$). In addition, confirmation ($p<0.01$) also contributes to the acquisition of cohesion. The prevalence of the three sensory variables within a learning sequence, starting and finishing with confirmation, is shown in Table 2 and two learning sequences.

Table 2.

		Auditory*		**Visual*****		**Confirmation********	
		All bands		All bands		All bands	
		No	Yes	No	Yes	No	Yes
Cohesion	No	185	461	212	434	410	236
		76,1%	90,7%	91,4%	83,6%	52,0%	80,5%
	Yes	58	47	20	85	48	57
		23.9%	9,3%	8,6%	16,4%	10,5%	19,5%
Total		243	508	232	519	458	293
		100%	100%	100%	100%	100%	100%
Sig		p= .000		p= .003		p= .000	

For acquiring cohesion, confirmation seems to play a central role in the learning sequence, as the start of the sequence as well as the final activity in the sequential structure. The outcome of the interview analysis corresponds with the data in Table 2. It shows that deploying visual interaction gives a 16.4% chance of cohesion against 8,6% when visual focus is not deployed. Visual focus, thus, renders a twice higher chance of cohesion than omitting visual focus. Derived from the interviews I detected two forms of visual confirmation in relation to cohesion. First, students tend to deploy visual confirmation to detect the right beat to start and sustain cohesion. "When you steadily focus on each other then it becomes tightly synchronized", the singer of DSOPM1 explains. Second, visual confirmation is associated with preparation for sudden changes. The drummer and the pianist from DSOPM2 discuss why visual focus is important for them:

D: A good example is the ending of *Mister Blue Sky*. I clearly demonstrate the ending in such a way that everybody turns around and looks at me when the sticks hit the cymbals. I believe that this is not only based on hearing. It is obviously important, but it is predominantly visual.

P: I think it [hearing] is important. Hearing is a constant factor, since you steadily listen to music. With hearing you get the feeling right, but for cohesion and songs with lots of variation hearing is not sufficient because it changes quickly. If you only focus on hearing you are definitely too late.

While visual focus supports sudden changes, variation, and sustainment of cohesion, students refer to auditory involvement as a constant factor. In contrast with the interview analysis, Table 2 shows an unexpected negative relation between auditory focus and cohesion. Not using auditory renders a 23.9% chance of cohesion, while using auditory focus gives a 9.3 % chance of acquiring cohesion. This surprising difference could be explained by the nature of my analysis. I only labelled auditory activities with the proviso that listening was deliberately chosen as the main sensory activity. This is based on the premise that deliberate listening often occurs when students display insecurity or need utter concentration to prepare for a difficult musical phrase ahead. In the case of consciously deployed auditory focus, I could label auditory focus as a deliberate form of interaction. For example, when students turn their head down and display full concentration on the sound, auditory focus is consciously chosen. It goes without saying that auditory focus is essential to music making and therefore considered a default sensory mode of learning. The confirmation sequence below exemplifies the default role of hearing as opposed to conscious auditory focus.

The first learning sequence opens with confirmation by means of auditory focus and visual contact, gazing upon the teacher or peer, followed by imitation of the bodily movements in synchrony with the beat. A variation on this same sequence is confirmation through immediate kinaesthetic movements as seen in video 3. The pianist emphasises triplet chords with bigger shoulder movements. The drummer looks briefly, listens and increases his volume in congruence with triplet emphasised chords. As a response to the increased volume, the guitarist monitors the drums and makes stronger head movement on the drummers groove to confirm the dominant pulse.

Video 3: Confirmation Sequence

In both sequences, students locate the dominant beat by auditory focus and visual contact, followed by confirmation through auditory focus, and finally imitation of kinaesthetic movements. Within the complete sequence, auditory focus remains a constant factor in combination with visual focus and kinaesthetic imitation. Upon the constant layer of auditory information, students prioritize visual

information to confirm the right beat based on bodily movements. Only in the third step of the sequence students turn their head away and fully focus on the auditory information. In the course of this phase the students process external visual and auditory information obtained during peer interaction. By solely relying on auditory information and visually closing of from their peers, the students seek to confirm previously learned skills. I consider it a reflective moment in which the students quickly monitor if they play the right musical material. After auditory confirmation, they briefly look at how the musical material is expressed through bodily movements, followed by immediate kinaesthetic imitation.

Confirmation sequence

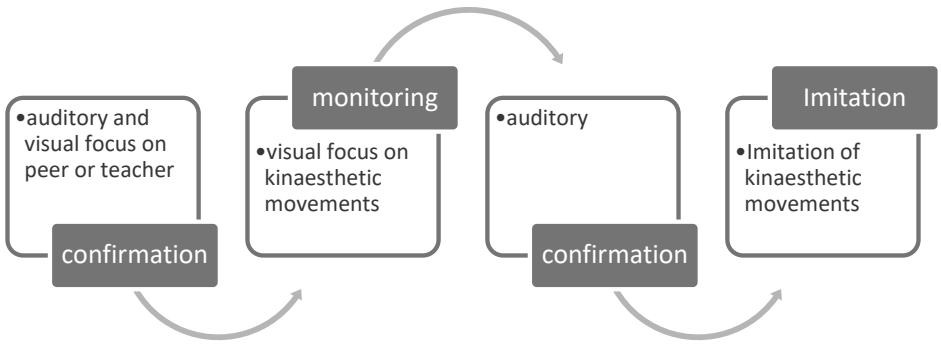


Table 2a shows that kinaesthetic activities render a 20.5% chance of achieving cohesion compared to a 4.3% chance of achieving cohesion without kinaesthetic activities for band members of Moxi Delight. There is a significant relation for Moxi Delight between kinaesthetic involvement and cohesion ($p<0.00$), which is absent for DSOPM1 ($p<.208$) and DSOPM2 ($p<.414$). A possible explanation for the striking difference in table 2a between Moxi Delight and the other bands is the role of the band coach in the learning process. Both DSOPM bands operate within a social constructivist learning environment with limited guidance from a teacher, aiming at collective learning and ownership. Rather than focusing on the coach, the band members of DSOPM are more self-directive. The students are expected to filter out their own mistakes, preferably without the help of the teacher. This often results in long winded discussions on how to solve a mistake. The band members of Moxi Delight rely much more on the band coach. Especially in the course of solving

mistakes, visual focus on gestural information from the coach and imitation of those kinaesthetic movements play an indispensable role in the learning process of Moxi Delight. The following examples illustrate how students from Moxi Delight locate their mistake and attempt to solve a musical problem by kinaesthetic imitation upon required visual information.

Table 2a

		Kinaesthetic		**Kinaesthetic**		**Kinaesthetic**	
		DSOPM1		DSOPM2		Moxi Delight	
		No	Yes	No	Yes	No	Yes
Cohesion	No	14	79	48	171	109	225
		93,3%	79,8%	94,2%	90,5%	96,6%	79,5%
	Yes	1	20	3	18	5	58
		6,7%	20,2%	5,8%	9,5%	4,4%	20,5%
Total		15	99	52	189	114	283
		100%	100%	100%	100%	100%	100%
Sig.		p= .208		p= .414		p= .000	

The students from Moxi Delight predominantly locate their mistake first by monitoring the teacher's movements. Throughout the focus group interview, the band members express their dependence on the coach during a correction sequence. In response to my question regarding problem solving, the singer explains: "I predominantly focus on facial expressions [facing towards Robin, the coach]".

> I: Can you give a few examples?
> S: When he is happy with the result you see contentment; the energy really rushes through his body. In case he is not satisfied, however, you can read it from his face. Sometimes you directly see, oh this is shit! So yes, I mostly focus on Robin.
> In another example the singer affirms that visual dependence on the coach is not confined to solving mistakes, but also serves as a token of confirmation: "I don't always know for sure when to start."
> I: How do you solve this?
> S: By looking at Robin obviously [students laughs].

In a similar vein, the drummer from the following example displays the same dependence from the coach to solve a particular mistake. In video 4 the drummer plays the accent too late. In response to the mistake, the teacher moves down in synchrony with the drummer to confirm the right accent. The drummer locates the mistake by monitoring the teacher, then gazes on his drum set while playing and concentrates on the sound. He now renders the right accent and finalizes the

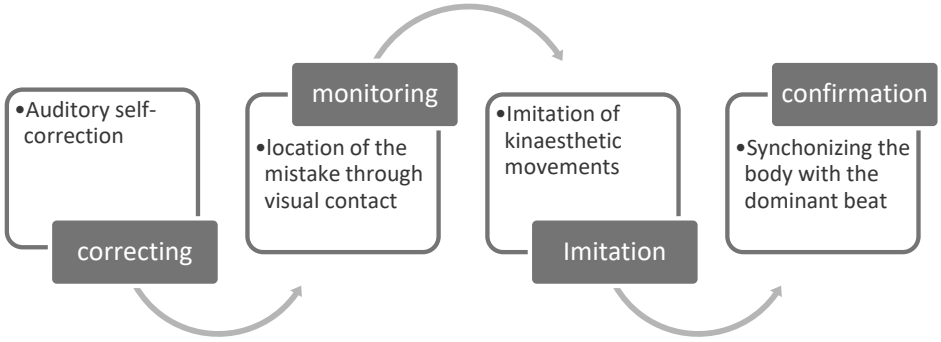
sequence by visual contact with the teacher for confirmation. They play the part again and follow the same sequence that proves to be successful.

Video 4: Correction Sequence

Besides this example, the analysis of the transcript shows that, during the correcting sequence, students or teachers consistently use kinaesthetic movements to correct others. Most students are, however, already aware of their mistake by self- auditory warning. In case they auditorily detect a mistake, students turn their head to the correction sender, who usually employs corrective clapping movements or pantomimic movements to show the right musical activity.

In the beginning of the sequence below, students first use their ears and then locate the mistake by visual contact. In furtherance, the students monitor the exact bodily movements, including beat markers and pantomimic depiction of a certain performance technique. After this bodily information has been processed, they imitate these movements in specific detail. The sequence, thus, concludes with the students prioritizing visual information in the form of bodily movements over auditory information. Finally, coupling this visual information with conscious kinaesthetic movements leads to complete cohesion between the band members.

Correction sequence:



Acquisition of Rhythm

Table 3a encapsulates the relation between confirmation and the acquisition of rhythm. As seen in the third column, for members of Moxi Delight, deploying confirmation yields rhythmic mastery in 14.4% of all occurrences, while this is only 7% without confirmation. The relationship between confirmation and rhythm mastery is significant (p=< .017) for Moxi Delight, yet non-significant for DSOPM1 (p=< .378) and DSOPM2 (p=< .239). This difference could again be the result of a teacher-centred approach. Through gestures and visual confirmation, the band coach scaffolds the learning process of each band member in such a way that focus on the teacher is required.

Table 3a.

		Confirmation		**Confirmation**		**Confirmation**	
		DSOPM1		DSOPM2		Moxi Delight	
		No	Yes	No	Yes	No	Yes
Rhythm	No	15	95	51	183	253	107
		100%	96%	100%	96,8%	93,0%	85,6%
	Yes	0	4	0	6	19	18
		0%	4,0%	0%	3,2%	7,0%	14,4%
Total		15	99	51	189	272	125
		100%	100%	100%	100%	100%	100%
Sig.		p= .378		p= .239		p= .017	

Throughout the interviews and episode reports, I discovered a pervasive pattern in the level of dependence on the band coach. “I mostly focus on facial expressions”, the singer explains while looking at the band coach. Elaborating on the nature of this focus, the singer exemplifies: “Sometimes Robin [band coach] verbally interrupts us. Besides he nods or points. Robin often signals us.” As described below, Moxi Delight band members strongly rely on their coach.

> Singer: During a solo [of the instrumentalists] I am very tentative and I try to feel when to start again.
> Interviewer: Do you know when to start?
> Singer: No, not always.
> Interviewer: And how do you find that out?
> Singer: By looking at Robin, hahaha [band coach]
> Robin: No!! You should count!

The final comment of the band coach succinctly illustrates the paradox of teacher centred coaching. Rather than building individual rhythmic skills, the students divert to the coach for problem solving. It is precisely the structured scaffolding of the coach that renders dependency on verbal and non-verbal communication.

Besides visual confirmation from the band coach, the band members seek auditory rhythmical confirmation from the drummer. The lead singer explains: “I predominantly focus on the drummer […] Obviously, the drummer provides the beat.” In turn, the drummer predominantly focuses on the bass player for visual confirmation on the beat marker.

Drawn from the interviews, all bands seem to relate confirmation with rhythmic acquisition. Asked to reflect on the use and purpose of confirmation, the drummer of DSOPM2 responds: “Because we [drums and bass] form the rhythm section. I focus more on you than vice versa.” The bass player, however, stresses that focus consists of more than visual communication: “Maybe I don’t look at you very often, but I most certainly pay attention. I predominantly listen to everything.” For the singers, demonstration of beat markers fulfil a central role in the learning process of rhythmic patterns. They mostly deploy visual focus on any instrumentalist who illustrates the beat with regular bodily movements. Finally, for rhythmic synchronization, the singers display visual focus on the piano player who clearly moves his hands and body in sync with the 8th note feel. In general, all students build their musical confidence on those who present clear beat markers. They seek for confirmation

during form transition or for mere synchronization by visual focus coupled with constant auditory involvement.

Imitation has a significant effect ($p<0.01$) on rhythm acquisition across bands. Table 3b shows that the use of imitation increases the chance of rhythm mastery to 12.3%, against a rate of 3.6% when imitation is not employed.

Table 3b.

		Imitation**	
		All bands	
		No	Yes
Rhythm	No	561	143
		95,4%	87,7%
	Yes	21	20
		3,6%	12,3%
Total		588	163
		100%	100%
Sig.		p= .001	

Based on table 3c, I set out to explore this analysis researching the role of imitation in the first sequence. Moxi Delight is the only band in which I found a significant relationship between imitation and rhythm acquisition ($p=< .006$). Acquiring rhythm has a likelihood of 15.3% when it is accompanied with imitation and of only 6.6% without it. In video 5 the teacher claps the right accents for the snare drum with his hands and head in synchrony with the beat. He uses such a device to isolate and visualize the rhythm for the drummer. In turn, the recipient listens to the accent, while looking at the teacher. Subsequent to this overlapping activity, he imitates the accents on his drum set without moving his body along. Coupled together, listening and looking form the first step in the sequence.

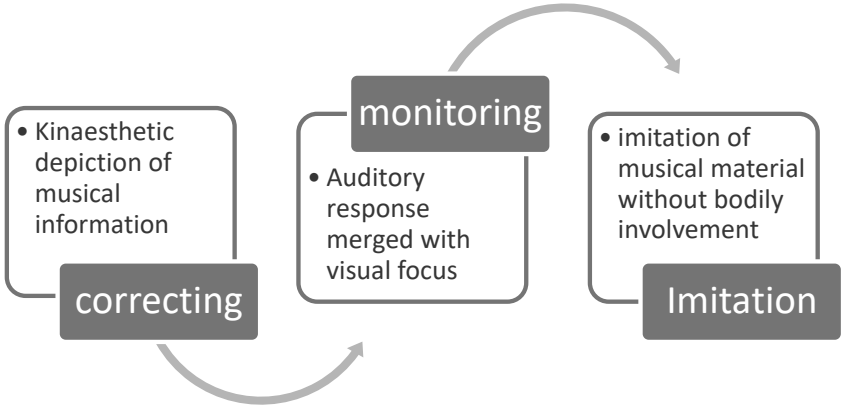
Video 5: Visual & Auditory Focus

Based on the place-event-analysis and the episode reports, I found that the example above is not an isolated learning sequence for Moxi Delight. Throughout the data set I find examples of teacher interference. Rather than letting the students explore independently, the band coach fulfils a prominent role as a corrector. Subsequently, the students focus on the bodily signs of the coach and imitate those accordingly; often leading to successful acquisition of rhythmic patterns.

Table 3c.

		Imitation		**Imitation**		**Imitation**	
		DSOPM1		DSOPM2		Moxi Delight	
		No	Yes	No	Yes	No	Yes
Rhythm	No	92	18	214	20	255	105
		95,8%	100%	97,7%	95,3	93,4%	84,7%
	Yes	4	0	5	1	18	19
		4,2%	0%	2,3%	4,7%	6,6%	15,3%
Total		96	18	219	21	273	124
		100%	100%	100%	100%	100%	100%
Sig.		p= .378		p= .487		p= .006	

Correcting sequence step 1:



The sequence above ends with imitation of musical material without bodily involvement. In the following section I inquire the effect of kinaesthetic involvement in rhythm acquisition. Table 3c shows that kinaesthetic involvement triples the chance of rhythm mastery (11.7% versus 3.5%) for band members of Moxi Delight. The significant relation between kinaesthetic involvement and

rhythm acquisition for Moxi Delight (p=< .011) is in stark contrast to DSOPM1 (p=< .428) and DSOPM2 (p=< .198). As argued above, the band coach of Moxi Delight deploys active bodily movements and hand gestures to correct the students. Consequently, the students absorb this information through visual focus and imitate this kinaesthetic information accordingly. Based on table 3d and the interview analysis, I argue: the more kinaesthetic involvement of the teacher, the more kinaesthetic imitation by students, which leads to an increased chance of mastering rhythmic patterns.

Table 3d.

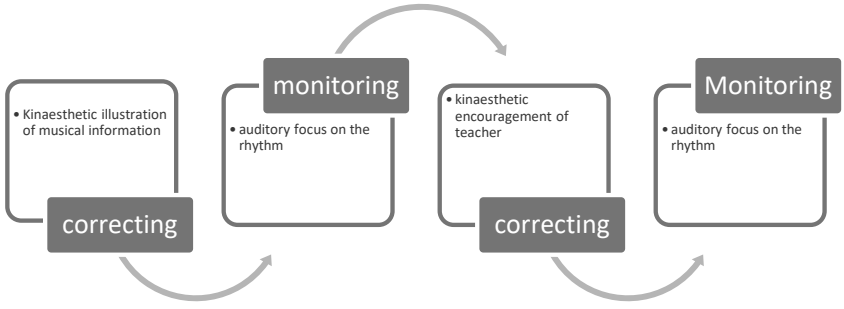
		Kinaesthetic		**Kinaesthetic**		**Kinaesthetic**	
		DSOPM1		DSOPM2		Moxi Delight	
		No	Yes	No	Yes	No	Yes
Rhythm	No	15	95	51	183	110	250
		100%	96%	100%	96,8%	96,5%	88,3%
	Yes	0	4	0	6	4	33
		0%	4%	0%	3,2%	3,5%	11,7%
Total		15	99	51	189	114	283
		100%	100%	100%	100%	100%	100%
Sig.		p= .428		p= .198		p= .011	

I will explain this indispensable role of bodily involvement with the continuation of *correction sequence step 1.* In correction sequence step 2, during the second attempt, the teacher and the drummer's peers add supplemented kinaesthetic correction to the learning sequence. The drummer, however, solely relies on his ears. Consequently, the student fails to master the rhythm. Mere listening seems insufficient.

In the first part of video 6, I explain how auditory focus coupled with kinaesthetic involvement leads to rhythm acquisition. During the first step of the sequence, the drummer looks straight ahead, only using auditory information to play the right rhythm. The teacher corrects him by clapping the right accents, emphasizing the rhythm by moving forward with his body. In addition, the piano player imitates the accents of the teacher and moves his body strongly forward in synchrony with the specific drum pattern. Both the teacher and the pianist employ bodily movements to illustrate the rhythm. Concurrently, they encourage the drummer to join their embodied approach. The recipient, however, seems to ignore their signals and merely focuses on the auditory information. As becomes clear in both examples, the impact of auditory information is not immediate, but needs time to take effect. It appears that the belated understanding of this complex rhythm can only occur in combination with another independent variable.

Video 6: Acquisition of Rhythm (auditory focus)

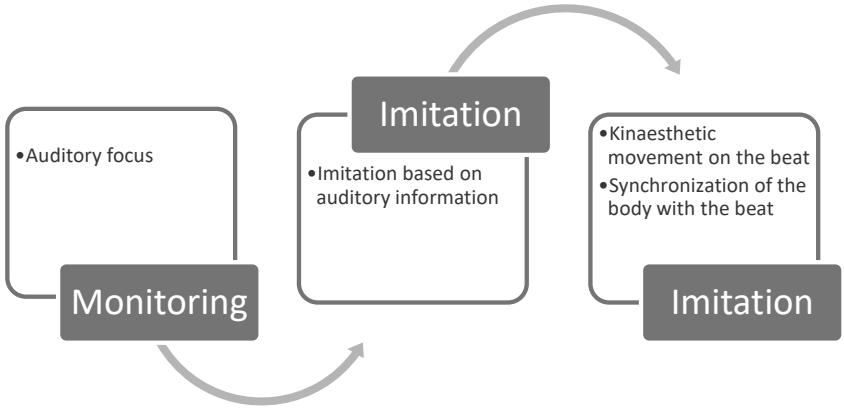
Correction sequence step 2:



The learning sequence generally ends with kinaesthetic confirmation to have an effect on the acquisition of musical skills and knowledge. Besides convincing data from Table 3d, the qualitative analysis clearly shows repeatedly throughout the transcript and sequence analysis that just before the moment of acquisition, bodily involvement seems to play a central role in the learning process. To exemplify, in the final part of video 6 (Acquisition of rhythm) we can see the drummer point his gaze straight ahead, giving way to auditory information. The pianist moves his upper body strongly on each first beat of the accents of the chords, while focusing on the drummer. Despite the drummer not monitoring the kinaesthetic information of the pianist, he imitates his movements based on auditory information; the emphasized accents of the chords. As a result, the drummer synchronizes his body with the dominant pulse, whereupon the more complex accents after the beat automatically fall into place. Auditory information alone does not guarantee the acquisition of

rhythmic patterns. This example puts forward the essential role of conscious kinaesthetic actions after the processing of auditory information in combination with visual information.

Imitation sequence:



In sum, learning rhythms in this sequential order is not confined to the above examples. Throughout the complete qualitative dataset, it appears that the sequence of learning rhythms takes off with correcting through kinaesthetic actions by the teacher or peer. The recipient processes this information by means of coupled auditory and visual learning, followed by imitation without bodily involvement. They merely imitate the sound and omit any form of kinaesthetic involvement, marking a lapse of confidence. Consequently, the students generally fail to perform the right rhythm. Auditory and visual information alone does not lead to acquisition. Glued together with active bodily involvement, this combination is contributory to learning complex rhythms.

Acquisition of form

The crosstab analysis in table 4 demonstrates that confirmation strongly enhances the likelihood of acquiring form. For all bands, confirmation stands out as an essential tool during the learning process of form. Especially for DSOPM1, the use of confirmation increases the change of form mastery by 9,7%, whereas not using confirmation renders 0% change of acquisition (p=< .021). Even more significant (p=< .000) is the relation between confirmation and form for Moxi Delight. In case of confirmation there is a 16% chance of form mastery against 3.7% of no confirmation. For all bands, confirmation plays an essential role in acquiring form.

Table 4

		Confirmation		Confirmation		Confirmation	
		DSOPM1		DSOPM2		Moxi Delight	
		No	Yes	No	Yes	No	Yes
Form	No	52	56	134	101	262	105
		100%	90,3%	100%	96,2%	96,3%	84,0%
	Yes	0	6	0	5	10	20
		0%	9,7%	0%	4,7%	3,7%	16,0%
Total		52	62	134	106	272	125
		100%	100%	100%	100%	100%	100%
Sig.		p= .021		p= .011		p= .000	

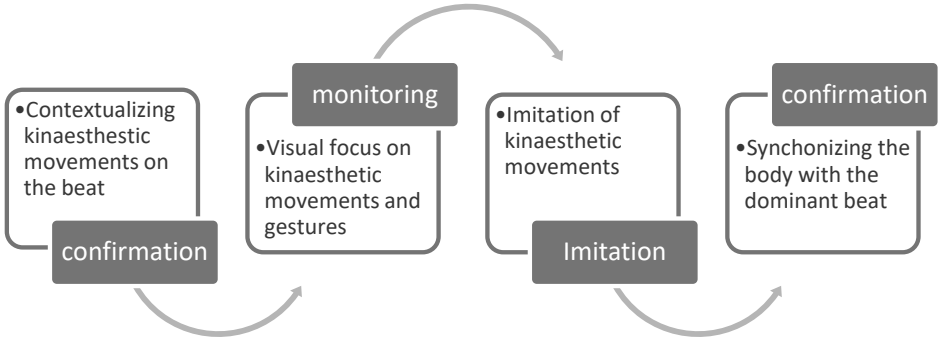
Taking a closer look at the episode reports, I find that confirmation in the beginning of a sequence goes hand in hand with confirmation as a final step in the sequential order. As seen in video 7, the teacher proposes to play the sustained chords for six beats, marking the transition between the instrumental interlude and the chorus. Juxtaposed against a quadruple meter, a divergent beat creates an interesting variation. The teacher counts and moves his hand down on the one. The guitarist looks down and listens to the teacher's counting while moving along with his body. Despite his bodily involvement, he doesn't feel the 6/4-meter and the guitarist wants to play the more common quadruple. The teacher emphasizes beats 5 and 6 with his hand while the guitarist observes him, coupled with imitation of his beat marker movements with his head. To ensure a successful transition from a quadruple to a 6/4-meter, the band needs to play the same part again. The teacher loudly counts the 6 beats, providing auditory information. Based on that information, the bass player monitors the guitarist and moves his head on the beat, imitating his movements. The drummer hits the drum sticks on his leg, kinaesthetically confirming the length of the bar, while gazing upon the bodily movements of the guitarist. Interestingly, on the first beat of the regular quadruple meter the whole band makes a collective movement down on the first beat, demonstrating acquisition of form. This movement illustrates that collective kinaesthetic involvement is essential to confirm the transition from one part to another.

The singer of DSOPM1 comprehensively describes this rather ineffable learning process of form: "We had a break of six beats, followed by two beats and then four beats. I really try to count 1,2,3,4. I do hear the drum increasing in volume, but I need to keep counting in my head. Obviously, it needs to sound super tight. Like four beats feel natural, but six beats require counting" (she counts 1,2,3,4 and moves her body accordingly).

Video 7:Confirmation Sequence

Let me summarize the above learning process into a possible learning sequence for form into two separate sequences. The first sequence shows confirmation in the form of kinaesthetic movements, followed by visual monitoring of the teachers' beat markers by the student. After this, the student deliberately imitates this movement by means of kinaesthetic head movements on the beat, confirming the acquisition of the irregular meter and transition to the chorus. To guarantee a smooth transition, the teacher proposes to play the same part again.

Confirmation sequence:



This musically illustrated explanation of conscious and preparatory kinaesthetic involvement reveals the crux of form acquisition. The findings above are in congruence with Table 4a. For all bands, chances to acquire form triple in combination with deployment of kinaesthetic activities (p=< .028).

Prevalent throughout the result section is the seemingly contradicting data in Table 4a on auditory involvement. Recurrently, auditory focus seems related to failing musical skills. Looking at Table 4a, the chance to acquire form is 3.5% in combination with auditory focus, against 9.5% whilst not using it. The numbers seems to imply that listening might obstruct the learning process. This

contradiction requires further elaboration. As stated before, I consider listening a default learning mode in music making. At the same time, in certain instances the students prioritize other sensory and musical interaction modes over mere listening. In other words, listening is always present, but to obtain form students need to couple auditory focus with another sensory activity. Extrapolating from this data, interviews and episode reports, I argue that mere auditory focus seems insufficient and requires a combination with other sensory activities. I will elucidate how the coupling of various senses with auditory focus results in form mastery with the following sequence. This sequence is almost similar to the first one, but differs in the prominent place that auditory information holds in the learning process. After all, the teacher counts the six beats, providing the students with essential auditory information. After this auditory confirmation, the band members monitor each other visually, specifically by gazing at their peers' bodily movements The students, thus, seek for confirmation and ubiquitously hierarchize the senses by merging them whilst prioritizing visual over auditory information. The data in table 4a, columns 1, 2 and 4, underpin this finding. Auditory combined with visual monitoring, enhances the acquisition of form by almost 3 times.

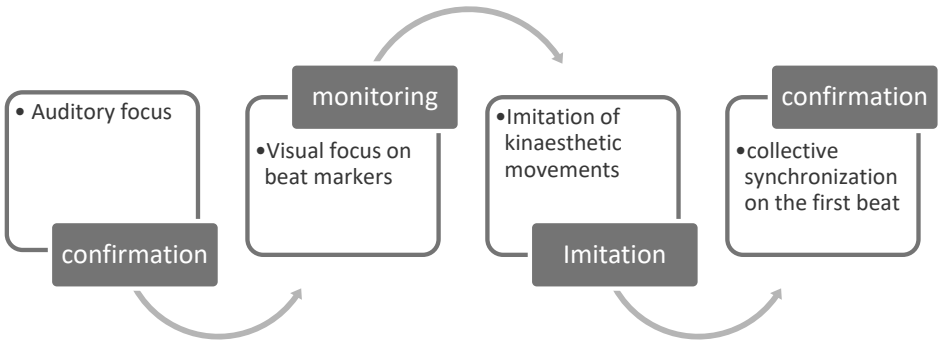
Table 4a

		Monitoring**		**Visual*****		**Auditory******		**Kinaesthetic*******	
		All bands		All bands		All bands		All bands	
		No	Yes	No	Yes	No	Yes	No	Yes
Form	No	216	494	226	484	220	490	176	534
		97,3%	93,4%	97,4%	93,3%	90,5%	96,5%	97,8%	93,5%
	Yes	6	35	6	35	23	18	4	37
		2,7%	6,6%	2,6%	6,7%	9,5%	3,5%	2,2%	6,5%
Total		222	529	232	519	243	508	180	571
		100%	100%	100%	100%	100%	100%	100%	100%
Sig.		p= .031		p=.020		p=.001		p=.028	

As the drummer of DSOPM puts it: "Obviously, the bulk of practicing consists of listening to each other, but some moments require visual focus." In a similar vein, the singer of Moxi Delight explains: For example, if he [drummer] plays a fill or the beat suddenly changes, then you know that you need to sing something else; a chorus for example." She continues by stressing the importance of visual confirmation: "I focus completely on what is coming; a chorus, verse or a solo…I know this by focusing on the band coach." All the data point in the direction indicating that the acquisition of

form depends on monitoring the other for visual information in the form of beat markers, and later in time, auditory information to confirm the right beat, coupled with visual information of kinaesthetic movements. The sequence closes with a collective and identical kinaesthetic confirmative movement on the one. This brings to bear that active mirroring of bodily movements is the final essential step before acquiring form.

Confirmation sequence:

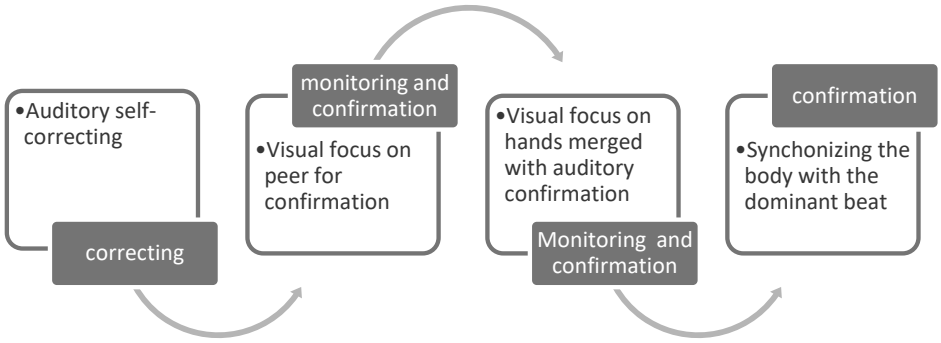


The third sequence in acquiring form is correcting. Surprisingly, correcting did not emerge from the cross tab analysis, but obviously goes hand in hand with learning and is prevalent throughout the interviews and episode reports. I will exemplify the third sequence by analysing video 8. The band needs to play an ostinato bass rhythm with a modulation after four bars. The pianist and the guitarist look straight at each other. Both employ strong feet taps on the beat. At the end of the fourth bar the pianist signals the guitarist that the modulation is near with an acknowledgement token in the form of a small head nod. The guitar player receives this valuable information through visual contact. He briefly looks down at his hand, mainly listening to the music, while keeping a steady beat with his foot. During the modulation he is too late and plays the wrong key. The teacher corrects him by pointing at the piano player, which provides the essential auditory information. The guitarist registers his mistake based on auditory information; the dissonant sound obviously alerts him. He immediately focuses on the pianist, then looks down at his hands to determine the right key through auditory information. He briefly gazes upon the hand of the teacher, followed by a confirmation towards the teacher that he found the right key by means of stronger head nods on the beat.

Video 8: Correction Sequence

In sum, this correction sequence starts with self-correction based on auditory information. After that, visual contact renders confirmation of the actual mistake. Repeatedly, the coupling of auditory information with monitoring, as seen in the interaction analysis, seems to offer a pivotal link in the sequence. In this case, the correcting hand move of the teacher serves as a confirmation, since the guitarist already locates his mistake auditorily. He ends the sequence with a confirmative nod that he found the right key, followed by kinaesthetic bodily movements. Interestingly, in this sequence the guitarist produces a form of self-correcting (Jefferson, 2006) that minimizes the pervasiveness of erroneous activities, such as belated starts of modulations. Equipped with auditory senses, he notices his own mistake, confirms this by visual information and demonstrates acquisition by kinaesthetic, synchronized bodily movements.

Correction sequence:



Self-correction does not necessarily mean that the transition from one part to another proceeds according to plan. The band members first put the above learning sequence to the test in order to demonstrate acquisition of form. In video 9, the guitarist sets his imperturbable gaze on the pianist

and moves his body in synchronization with his peer. Just before the actual modulation he averts his focus from the pianist to his own hands and then changes to another key, moving his body on the beat, while looking up again. After the above correction, this sequence takes off with monitoring a peer to gather visual information, in combination with steady kinaesthetic movements. In the second phase, the guitarist monitors himself, conjoined with auditory confirmation. Finally, the sequence ends with stronger kinaesthetic movements and a confirmative gaze at the pianist. As I suggested earlier, the pervasive kinaesthetic closure seems to be an essential link in the acquisition of form.

Video 9: Self-Correction Sequence

Acquisition of melodic patterns

The cross tab analysis in table 5 shows that imitation for all bands ($p<0.000$), and auditory for Moxi Delight ($p<0.013$) in table 5a have a strong effect on the acquisition of melodic patterns. For DSOPM1 no statistics were computed because the acquisition of melody played no role in their repertoire. In the cross tabs for DSOPM2 I only found two occurrences of melodic acquisition out of 240 clips. One possible explanation is that the songs were either part of a collective cultural memory or composed by the students. Extrapolating on 1 imitation sequence and 4 correction sequences, I will elucidate the central role of imitation and listening in relation to melodic learning.

Table 5.

		Imitation*		**Imitation****	
		All bands		Moxi delight	
		No	Yes	No	Yes
Melody	No	572	147	259	108
		97,3%	90,2%	94,9%	87,0%
	Yes	16	16	14	16
		2,7%	9,8%	5,1%	13,0%
Total		588	163	273	124
		100%	100%	100%	100%
Sig.		p= .000		p= .007	

When it comes to learning a melody, imitation is a central musical interaction form deployed frequently by the students. As seen in Table 5, it is around 3 times as likely to master a melody in combination with imitation than without. Since Moxi Delight performs Caribbean music and jazz, emblematic for more complex melodic structures, imitation holds a central place in the learning process.

A clear example of an imitation sequence, with sole emphasis on auditory learning, emerges from the episode reports. In clip 1 the solo singer performs too low. Upon auditory detection of her mistake, she listens to the corrective melodic information offered by the sax player. After having processed this information she sings the right pitch. Repeatedly, auditory imitation leads to acquisition of melodic patterns. In the episode report clip 3 below, we can see the same combination of keywords linked to melodic learning. After correction, the students depend on auditory information to improve their melodic performance. Contrary to acquisition of other music skills, melodic learning can solely depend on auditory input. The bass player of Moxi Delight succinctly explains: “For example, when I detect an interesting melodic line in a solo I listen quickly and imitate that same material.” The unique combination of auditory and immediate imitation is emblematic for melodic learning.

Episode Report: MOV03F-Analysis Quick Clip 1

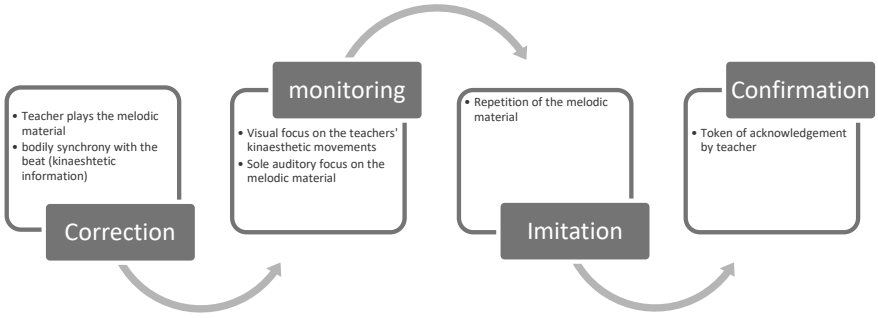
Collection: Quick Clips
File: C:\Users\jaco\Videos\Moxi delight\rehearsal 2\MOV03F-Analysis.mp4
Time: 0:00:00.0 - 0:00:10.8 (**Length:** 0:00:10.8)
Series: Moxi delight
Episode: MOV03F-Analysis
Episode Transcript: Rehearsal 2 part 4
Clip Transcript:
Singers move in synchrony (entrainment).
2nd soloist sings too low,
hears the sax play the melody.
she takes over at the right pitch
Clip Keywords:
Musical interaction : Correcting
Musical interaction : Imitation
sensory model : Auditory
sensory model : kinaesthetic
Outcome variables : Acquisition of melodic patterns

Episode Report: MOV03F-Analysis Quick Clip 3

Collection: Quick Clips
File: C:\Users\jaco\Videos\Moxi delight\rehearsal 2\MOV03F-Analysis.mp4
Time: 0:02:34.6 - 0:03:40.5 (**Length:** 0:01:05.9)
Series: Moxi delight
Episode: MOV03F-Analysis
Episode Transcript: Rehearsal 2 part 4
Clip Transcript:
Teacher sings the melody right after the solo.
Teacher shows the chords on piano
Singers correct themselves on the pitch of the melody,
sings high, then low to show the difference.
2nd singer imitates too high-
Correction by other two singers, they sing higher, she imitates the right notes.
Clip Keywords:
Musical interaction : Correcting
Musical interaction : Imitation
Musical interaction : Monitoring
sensory model : Auditory
Outcome variables : Acquisition of melodic patterns

The imitation sequence below summarizes the above analysis and consists of various small but quick steps, yielding an immediate effect on the learner.

Imitation sequence:



As shown in the previous section, auditory focus requires a combination with other interaction and sensory modes to be effective in acquiring music skills. Interestingly, auditory focus in relation to melody learning breaks this prevalent pattern. Contrary to other dependent variables, melodic

learning benefits from mere auditory focus. Table 5ashows that for Moxi Delight the deployment of auditory focus renders a chance of 10,7% to obtain a melody, against 4,2% in case of not concentrating on the sound. For melodic learning and synchronization, singers employ exacerbated auditory attention on specific idiosyncratic elements in the music. Since for DSOPM2, melodic acquisition only occurred two times, I draw on the interviews to explain the role of listening in melody mastery. The lead singer of DSOPM 2 elaborates: “Sometimes there is a guitar riff perfectly in sync with a vocal line or a piano part or drum fill. Well, I try to connect [by ear] with the accents from the instrumentalists and I attempt to synchronize my vocals with it.” In correspondence with this, the drummer of Moxi Delight identifies the sequence of sensory learning: “It is important that I play in sync with the other band members. The keyboard player fulfils a melodic function which should be in sync with my kick. First, I listen to the melody and then I make brief eye contact.” Apparently, predominant auditory focus supports melodic and rhythmic synchronization while sudden changes in form require visual focus and confirmation.

Table 5a.

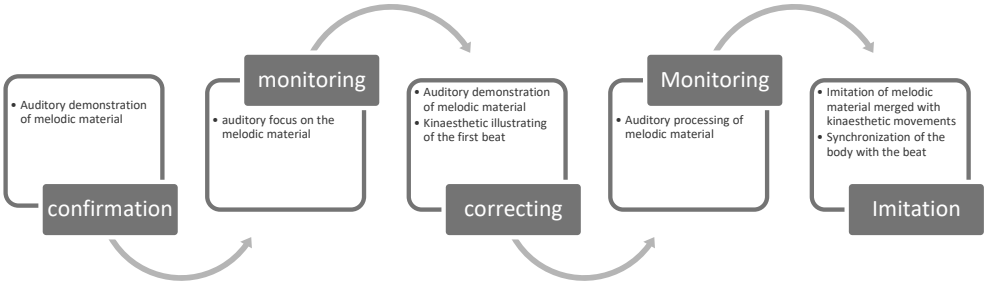
		Auditory* **	
		Moxi Delight	
		No	Yes
Melody	No	184	183
		95,8%	89,3%
	Yes	8	22
		4,2%	10,7%
Total		192	205
		100%	100%
Sig.		p=.013	

In the following video example, video 10, a more complex sequence unfolds. The sequence is part of a longer harmonic exercise in which the acquisition of knowledge and skills manifests later in time. Therefore, I divide the sequence in 3 parts, illustrating the various steps students take to learn and acquire a melody.

Video 10:Correction Sequence

During the exercise, as seen in the video, the teacher conveys harmonic flexibility, by letting the singer sing the theme in various keys. The sequence takes off with a melodic confirmation by the teacher. As a preparation, the singer slightly raises her head and merely listens to the chord progression without moving her body. After auditory detection of the first few notes of the melodic patterns, she briefly looks up, jumps in and finalizes the theme. They repeat this again, without satisfaction of the teacher. He corrects her by playing the theme with an emphasized first note. The teacher verbalizes her mistake and plays the theme again, while the singer processes the melodic information. While doing so, she sings the pattern again, holds her head down and concentrates. Thereafter, she synchronically moves her head on the beat.

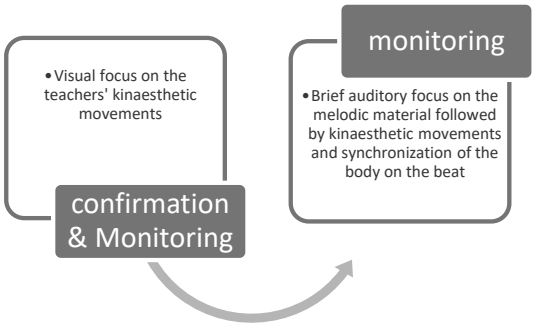
Correction sequence part 1:



During the correction sequence part 2, the teacher tests whether this attempt was perhaps sheer luck in a short repetition of the exercise. The sequence starts with a brief visual confirmation of the beat (short gaze at the teacher), immediately followed by auditory processes (head down to concentrate). This isolated moment of utter auditory concentration corresponds with the data of table 5. Albeit brief, isolated auditory concentration holds a prominent place in the learning

sequence. Apparently, students need mere auditory focus to explore the melodic contours before playing it. Shortly after melodic processing, auditory focus is overlapped with kinaesthetic bodily movements in the form of foot tapping and head moving on the beat. This sequential order in which students absorb auditory information, immediately followed by kinaesthetic learning, proves to be conducive to the acquisition of melodic patterns.

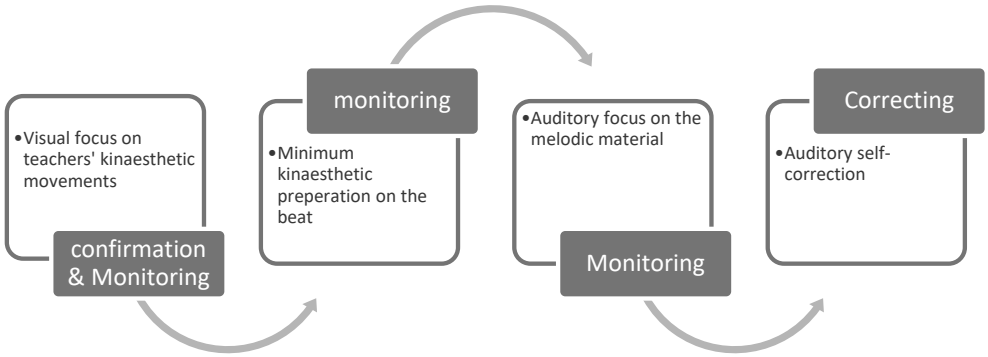
Correction sequence part 2:



The effect of withholding kinaesthetic learning from the sequence is seen in the following video (video 11). The student practices the harmonic exercise again, switching keys after each theme. In this learning sequence she briefly monitors the teacher, immediately followed by a minimum kinaesthetic movement on the beat as a preparation for the start of here melodic line. Subsequently, the vocalist looks down to fully process the auditory information, but concurrently omits kinaesthetic involvement. Interestingly, she fails and desperately tries to find the right key.

Video 11:Correction Sequence

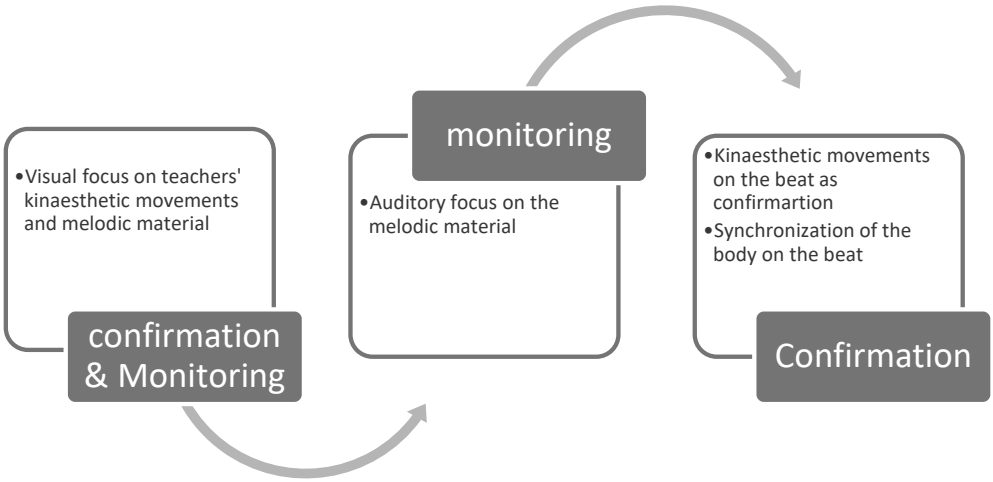
Correction sequence part 3:



In the self-corrective attempt (video 12), however, she follows the complete sequence, going from *melodic confirmation, monitoring, visual, auditory, and kinaesthetic synchronization with the beat, to acquisition of melodic patterns.* The final step in the sequence below seems to be essential. The students clearly demonstrates full acquisition by conscious kinaesthetic movements, synchronizing the body with the dominant pulse. It shows up again and again in the analysis that kinaesthetic learning plays a central role in the learning process.

Video 12: Acquisition of Melody

Correction sequence part 4



The above sequences put forward two essential elements of melodic acquisition. First, after melodic presentation, auditory focus occurs as an isolated event. Second, after melodic processing, conscious alignment from the body with the beat contributes to melodic acquisition. Derived from the data, I claim that learning melodic patterns is an accumulative and more time consuming process; it takes repetition to grasp and flawlessly perform a melody. Within all cases studied, deploying correction, visual contact, isolated auditory focus, and kinaesthetic learning are all part of a successful learning sequence. Provided that the students follow the sequence above, and do not omit a single independent variable, the learning process leads to melodic acquisition later in time.

Acquisition of tempo

Tempo requires rhythmic collective cohesion between a group of musicians. Within cohesion, various parameters, such as harmony, scales, and rhythms operate simultaneously rather than remaining independent (Middleton, 1983). Whereas cohesion gives equal weight to musical parameters, tempo prioritizes rhythm over other parameters. Students can play the wrong chords, but still acquire the right tempo.

In the total amount of 751 clips there are only eight cases of acquisition of tempo, from which five cases occurred within the DSOPM2 rehearsals. Interestingly, from those five cases, tempo acquisition occurred once with and four times without imitation. Compared with DSOPM2, band members of DSOPM1 successfully deployed imitation in combination with tempo. As a result, table 6 demonstrates that for DSOPM1 the use of imitation renders a positive effect on the acquisition of tempo by 11, 1%, against 0% in case of not deploying imitation. Both bands deploy imitation in relation to tempo acquisition. For band members of DSOPM2, however, attempts to acquire tempo are not effortless and require a stepwise learning trajectory. Due to the limited number of clips, I draw on the episode reports for further analysis. The elaborate episode transcripts enabled me to investigate the sequential order of musical communication and sensory learning and their potential ramifications for the learning process.

Table 6.

		Imitation		**Imitation**		**Imitation**	
		DSOPM1		DSOPM2		Moxi Delight	
		No	Yes	No	Yes	No	Yes
Tempo	No	96	16	215	21	272	124
		100%	88,9%	97,70%	99,2%	99,6%	89,3%
	Yes	0	2	4	1	1	0
		0%	11,1%	2,3%	0%	0,4%	0%
Total		96	18	219	22	273	124
		100%	100%	100%	100%	100%	100%
Sig.		p=.001		p=.484		p=.500	

As presented in table 6, there is a significant relation between imitation and tempo acquisition for DSOPM1 ($p<.001$). In the place-event analysis, I suggested that the band members are quite compatible and share a comparable skill set. The inculcation of instrument mastery is held to be conducive to increased collective learning. Since the students have little problem playing the right notes, there is room to deploy visual focus on others and draw essential kinaesthetic information from specific tempo related movements. The episode report below demonstrates how DSOPM1 students first relate to tempo based on visual focus on kinaesthetic movements. Built on this visual image, students deploy auditory focus on the acceleration of the beat. Finally, they observe and imitate each other's movements to synchronize collective with the decreasing tempo. Collective cohesion through identical bodily movements is key to tempo acquisition.

Episode Report: Rehearsal 4 part 1 Quick Clip 11

Collection: Quick Clips
File: C:\Users\jaco\Videos\Dsopm period 1\Rehearsal 4\MOV00E-Analysis.mp4
Time: 0:08:40.9 - 0:09:10.0 (**Length:** 0:00:29.1)
Series: Dsopm
Episode: Rehearsal 4 part 1
Episode Transcript: Rehearsal 4 part 1
Clip Transcript:
Guitar plays his solo higher and makes
strong movements with his body on the beat.
Drums short focus, takes over the movement,
increases the drive and sound.
Bass moves on the beat and listens,
he plays 16th notes and increases the drive and sound too.
keys moves his body on the beat.
Looks at drums to move in sync with his ending.
He moves his head on the accents, slowly decreasing the tempo (Acquisition)

Clip Keywords:
Musical interaction : Confirmation
Musical interaction : Imitation
Musical interaction : Monitoring
sensory model : Auditory
sensory model :kinaesthetic
sensory model : visual
outcome variables : Acquisition of cohesion
outcome variables : Acquisition of tempo

As suggested in Table 6, imitation and collective synchronization support tempo acquisition for DSOPM1. Albeit not significant for DSOPM2 ($p<.484$), cohesiveness in tempo also depends on imitation of bodily movements. The following interview fragment of DSOPM2 sheds light on the pivotal role of bodily imitation:

> Singer 1: I strive at syncing with the accents of other instrumentalists. Things that click. I try to match perfectly.
> Singer 2: It means you are feeling the groove
> Interviewer: What does that mean?
> Singer 2: The feeling of tempo.
> Interviewer: Does that involve a bodily response?
> Singer 2: Yes, very often jumping.

> Singer 1: I sway with the music…When we play a half time beat all musicians bounce on the beat. I clearly see that and copy the movements I think.

The students of DSOPM2 often interchange words like beat and groove as a reference for tempo. Albeit rather intangible and referred to as a feeling, synchronized movements and the imitation thereof seem to pertain to the acquisition of tempo. For students of DSOPM2, however, incorporation of musical material requires constant monitoring of their playing so that it often obstructs collective cohesion. They lack full instrument mastery and commodification providing them with means to disrupt individual monitoring in such a way that conscious collective cohesion can emerge. Students of DSOPM1 master their instrument on such a level that musical material is incorporated in their bodies. Consequently, they can consciously imitate movements of peers and create cohesion without that detracting from instrument mastery.

Through 2 video fragments, I elaborate on how students of DSOPM2 attempt to acquire tempo through bodily imitation, first on an individual level, followed by collective acquisition. During the rehearsal, the guitarist corrects the band members that the tempo is too slow. After collective agreement, he immediately demonstrates the appropriate tempo by swaying his upper body while mimicking the pulse with his hand on the guitar. He continues with deploying clear beat markers through hand clapping of the newly proposed beat in conjunction with looking at the drummer. In turn, the drummer monitors the guitarist, overlapped with processing the auditory information. Subsequently, the drummer imitates the proposed beat by playing it on the hi-hat, encouraging the bass player to confirm the tempo with steady head movements. After three bars of a steady beat, the bass player joins in and confirms full understanding of the tempo by playing along. The tempo, however, has not been confirmed by the complete band. As we can see in video 13 and the episode report below, the band members merely incorporated the tempo on an individual level rather than imitating collective movements.

Video 13: Individual Tempo Acquisition

Episode report: Rehearsal 4 part 1 Quick Clip 20

Collection: Quick Clips
File: C:\Users\jaco\Videos\DSOPM period 2\10-6 dsopm\MOV001-Analysis.mp4
Time: 0:03:53.3 - 0:04:18.4 (**Length:** 0:00:25.1)
Series: DSOPM 2
Episode: Rehearsal 4 part1
Episode Transcript: Rehearsal 4 part 1
Clip Transcript:
Band members correct drummer that he needs to play faster.
They listen to the metronome.
singer taps with his foot,
claps on the beat and sings along to embody the tempo

Clip Keywords:
Musical interaction : Confirmation
Musical interaction : Correcting
sensory model : Auditory
sensory model :kinaesthetic
Outcome variables : Acquisition of tempo (individually)

In the final video (14), the drummer kicks off with a countdown, monitored and auditorily processed by the whole band. All the band members collectively move their heads and even march on the beat, demonstrating and confirming their collective understanding of the appropriate tempo. The episode report demonstrates that the essential combination of monitoring followed by imitation of kinaesthetic movements leads to the acquisition of tempo.

Video 14: Collective Acquisition of Tempo

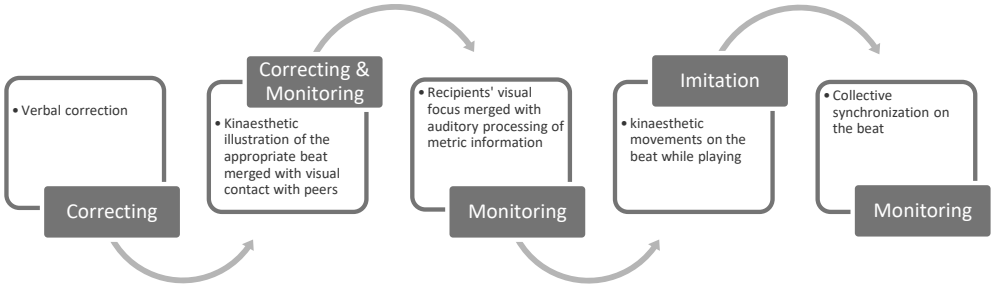
Episode report: Rehearsal 4 part 1 Quick Clip 21

Collection: Quick Clips
File: C:\Users\jaco\Videos\DSOPM period 2\10-6 dsopm\MOV001-Analysis.mp4
Time: 0:04:49.9 - 0:05:03.2 (**Length:** 0:00:13.3)
Series: DSOPM 2
Episode: Rehearsal 4 part1
Episode Transcript: Rehearsal 4 part 1
Clip Transcript:
Drummer countdown, looking at band.
During start he strongly moves his body on the beat.
Solid tempo.

Clip Keywords:
Musical interaction : Monitoring followed by imitation
sensory model : Auditory
sensory model : kinaesthetic
sensory model : visual
Outcome variables : Acquisition of tempo (collectively)

I will summarize this learning process in the correcting sequence below. The first part of the sequence starts with *correcting, kinaesthetic, monitoring, visual, auditory, imitation, kinaesthetic, confirmation.* After partial confirmation by the drummer, guitarist, and bass guitarist, the rest of the band confirm the tempo in the continuation of the sequence later in time. The second part of the sequential order is as follows: *monitoring, visual, auditory, kinaesthetic, confirmation*. Within all the sequences studied in the axial coding analysis, a pervasive pattern, starting with correcting, kinaesthetic movements, followed by monitoring, overlapped with auditory processing, finalized by imitation of the peers' movements by kinaesthetic involvement, emerges from the data. Interestingly, kinaesthetic involvement is ubiquitously represented in the above sequences, albeit with two different purposes. In the first part of the sequence it serves as a point of reference, illustrating an appropriate tempo. In this phase the peers merely observe and listen as an overlapping activity. During the second phase, kinaesthetic involvement follows after visual and auditory processing of information and contains collective synchronized movements, fostering strong cohesion within the group, resulting in the desired tempo.

Correction sequence:



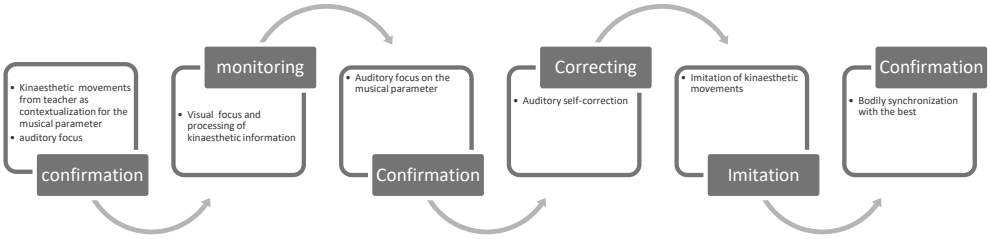
Generic patterns

In the section below I describe the generic sequences students deploy during the learning process. After comparing all 16 sequences described above, I was able to detect overlapping elements between 3 types of sequences which came to the surface during the analysis in the previous section: 1) confirmation sequences; 2) correction sequences; 3) imitation sequences. First, I summarize the order of steps students deploy during a learning sequence. This enables me to demonstrate the pathway of learning, which is conducive to understanding how and when students respond to specific musical embodied information. Second, I scrutinize how and when the senses translate into each other within each individual parameter, concluding with providing a description of generic modes of sensory merging. This enables me to understand the prioritization and merging of sensory activities in relation to knowledge and skill building. Third, I conclude this overarching analysis with demonstrating how intersensory learning gives access to musical knowledge and skills.

Confirmation sequences

As seen in the generic confirmation sequence below, one of the common features of a confirmation sequence is that it starts with kinaesthetic movements from the teacher, serving as a contextualization for the musical parameter. This kinaesthetic information, usually in the form of bodily movements in synchrony with the dominant beat in concurrency with beat marking gestures or pantomimic gestures, provides the student with essential information on the musical parameters at hand. Aside from the teacher's contextualization effort, students can also confirm a certain musical parameter through auditory focus. This often occurs during harmonic exercises. Both confirmation activities are followed by mere visual focus in which the student processes the kinaesthetic information provided by the teacher or peer. During the next step, the student deploys auditory focus on the musical parameter as a means of confirmation. In case a mistake occurs, the student employs auditory self-correction in the next step. Subsequently, imitation of the kinaesthetic movements, performed by the teacher in the first step, demonstrates active and conscious bodily involvement. It is in this step that the student consciously involve the body in the learning process, imitating observed kinaesthetic information. Finally, they confirm the acquisition of the musical material through bodily synchronization with the beat.

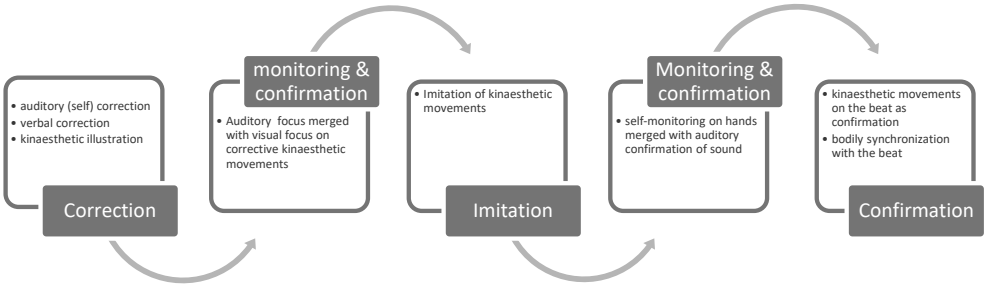
Generic confirmation sequence



Correction

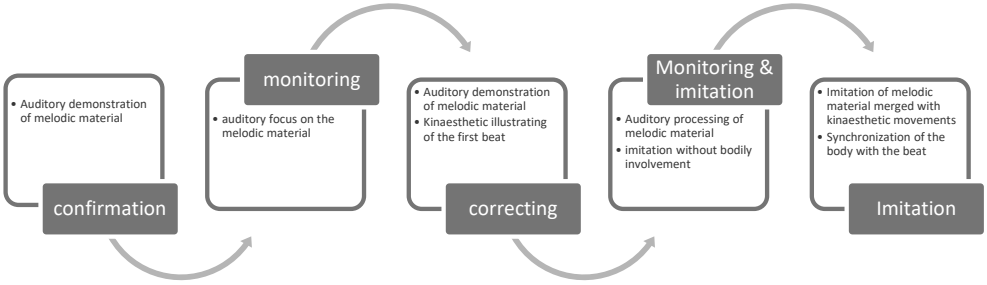
In the generic correction sequence below, correction starts with three different learning tools. Two tools are teacher-driven and one is student-based. The teacher-driven form associates with the most common form of correction in which the sender corrects the receiver with verbal corrections. I have found that, almost invariably, verbal corrections break the flow of musical learning and are therefore seldom employed by teachers. A more effective way of correcting students is kinaesthetic illustration of the right musical material. By doing so, the band continues playing while the teacher sends corrective information, which can be immediately implemented. In some cases, students detect their mistake on their own accord. With the third learning tool, students employ auditory self-correction. They auditorily perceive the sounding result of an unintended rhythm or series of notes, causing an immediate corrective response. The first corrective step within all three learning tools is met with auditory focus, concentrating on the appropriate sound, merged with visual focus on corrective kinaesthetic movements. After processing this information, students tend to imitate the kinaesthetic movements as the first active embodied endeavour. In the next step, students self-monitor their own body, confirming the appropriate kinaesthetic movement, merged with determining the appropriate sound. Based on the appropriate sound image and kinaesthetic information, both observed and actively embodied, students confirm the acquisition of knowledge through kinaesthetic movements in synchrony with the beat.

Generic correction sequence



Another phenomenon of interest within the cases of correction is auditory learning. Despite limited occurrence during the rehearsals, I focus on one specific odd case to show the process of predominant auditory learning and its precipitation on the acquisition of knowledge. As demonstrated in the sequence below, the teacher confirms the right melodic material by auditory demonstration. In the next step, the student mainly listens to the presented material. In a failing attempt to play the right material, the teacher responds with a correction, by coupling the auditory material with kinaesthetic illustration of the right melody. In turn, the student processes this information through mere auditory focus. In the final step, the student imitates the melodic material merged with kinaesthetic movements in synchrony with the beat. It seems that auditory focus alone does not lead to full understanding of the musical material. A complete understanding of the musical material at hand requires the active blending of auditory information with imitated kinaesthetic information and synchronization with the dominant beat.

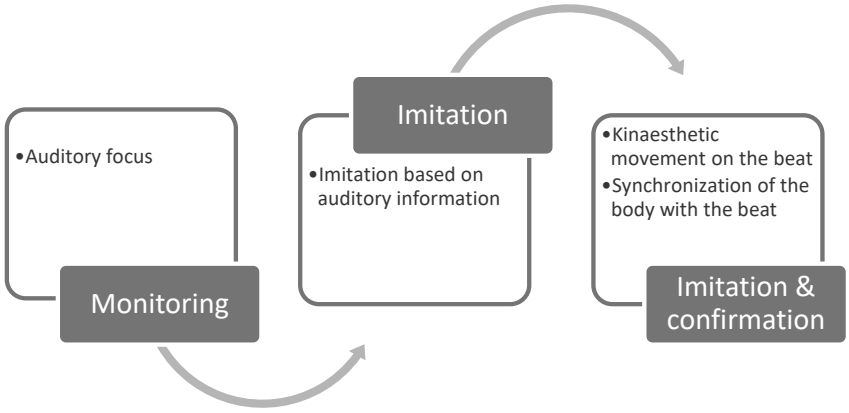
Corrective auditory sequence



Imitation

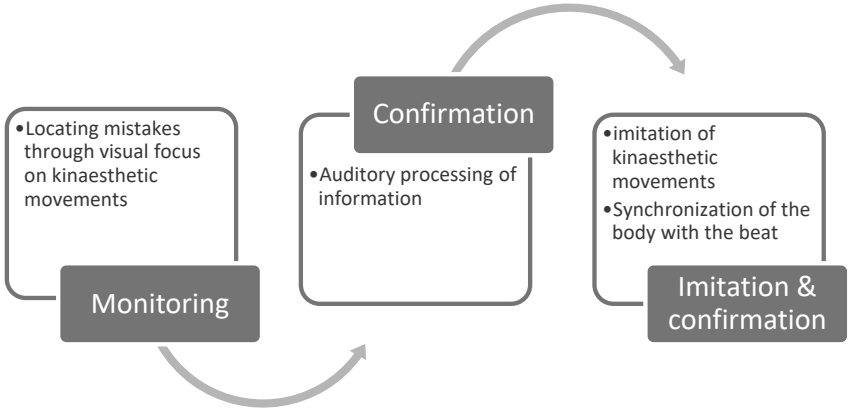
Imitation plays a central role in the following two sequences. I find two types of imitation sequences: 1) auditory imitation 2) visual imitation. I base the division between the two sequences on the specific strategy to locate a mistake. In the first sequence, the students take off with locating a mistake through auditory focus. Next, they immediately imitate the right musical material completely based on auditory information. To determine whether this imitation is sheer luck or not, the following iterative attempts to play the right musical material are always coupled with kinaesthetic movements and synchronization with the beat. As with the auditory correction sequence above, students repeat the act of imitation coupled with kinaesthetic movements. This endeavour not only confirms that the skills are acquired, but also contributes to processing the novel information in such a way that it completely ingrains in the learning body.

Auditory imitation sequence



The next sequence highlights visual learning. In the first step, students locate their mistake through visual focus on kinaesthetic movements of the teacher or peer. Subsequently, they process the material first by performing the right phrase or rhythm, confirming that they understand the novel material. Convincingly emerging from the generic sequence analysis, I note that all successful sequences end with kinaesthetic confirmation. The fact that every sequence leading towards acquisition concludes with kinaesthetic confirmation is not sheer coincidence, but a systematic sequential completion. My preliminary approximation is that kinaesthetic involvement is not only a form of confirmation, demonstrating the acquisition of musical knowledge and skills, but foremost serves as a cohesive glue between various musical interactions and sensory activities.

Visual imitation sequence



Prioritization and merging of the senses in relation to musical knowledge and skills

In the final part of the analysis, I search for conclusive overlapping relations between all forms of musical interaction, blended sensory activities on the one hand and the acquisition of musical knowledge and skills on the other hand. The separate chains in the sequence have been elaborately discussed in the first part of the results section, demonstrating how forms of interaction and sensory activities affect the acquisition of five musical parameters. For this analysis, I draw on data from the interaction analysis, showing the effect of coupled musical interaction forms and sensory activities on the acquisition of musical knowledge and skills. I extrapolate recurring combinations from the interaction analysis in the first part of the result section. To conclude, I search for recurring patterns of merging sensory activities and musical interaction, explaining how these intersensory learning activities give access to musical knowledge and skills in general. Regarding each individual dependent variable (five music skills) students tend to prioritize and merge specific musical interaction forms and sensory activities. Some merging modes, however, overlap and provide a generic theory on sensuous blending and prioritization. Drawing on these overlapping merging modes contributes to understanding how young musicians literally make sense of their musical world.

Learning chords and harmony bears on auditory focus and the merging with visual confirmation. As seen in the cross tabulation analysis in Table 1, any form of confirmation renders a chance of chord comprehension of 16% against a significantly lower likelihood of 3.7% when students do not use it. In many instances, confirmation in the form of a confirmative token such as a nod of the head represents the recognition of acquisition. Confirmation, thus, follows after the learning event. At the same time, confirmation does not only function as a token of appreciation, but can also involve the inquiry of the right voicing during the learning event itself. During this inquiry, students detect their own voicing in a larger harmonic context through prioritization of auditory learning. They do not couple this sensuous activity with other senses to fully concentrate on their specific voicing. In the next phase, they merge auditory focus with kinaesthetic head movements. Apparently, they need to see what they hear in the form of gestures or kinaesthetic movements. This suggests that listening to the harmonic context and understanding one's own voicing requires an active moving body. For locating the right rhythm of a chord, students prioritize to monitor kinaesthetic movements. Subsequently, they go from monitoring kinaesthetic movements to imitation. In the final phase students imitate the chords coupled with kinaesthetic movements, mirroring the previously observed kinaesthetic information.

To obtain cohesion, students blend visual confirmation with auditory focus. The learning sequence starts with a brief confirmation through visual focus on kinaesthetic information coupled with auditory focus on the dominant pulse. After processing this information, the young musicians

move their bodies on the pulse, coupling kinaesthetic involvement with monitoring. Reaching a certain level of cohesion depends on observing kinaesthetic information, followed by imitation of these movements. This suggests that the students need visual information on how their peers move, so they can synchronize accordingly. Furthermore, the students employ ongoing kinaesthetic movements coupled with obtaining crucial visual information of collective movements. Maintaining cohesion depends on sustaining kinaesthetic movements coupled with ongoing observation of possible changes in the contagious groove. It is self-evident that cohesion requires auditory focus as well as moving and observing. However, the fact that students couple observation with movements suggests that students prioritize visual information on kinaesthetic movements over auditory information to acquire cohesion. The only exception in this learning sequence is self-correction. In case students make a mistake, they first locate their error based on auditory information. Subsequently, they employ visual focus on kinaesthetic movements of peers and teachers to confirm whether their self-corrective move is right.

Rhythmic patterns require a recurring combination of auditory focus with immediate imitation. Imitation of kinaesthetic information is predominantly based on auditory information. It seems that rhythm is apparently strongly connected to internal movement of the body and does not require a visual image of others. Despite strong kinaesthetic tokens of correction in the form of gestures or bodily movements, students prioritize auditory focus to locate the right rhythm in their own body. However, when students omit kinaesthetic movement and merely employ auditory focus, failure evidently follows. From that point they need to listen again, coupled with monitoring kinaesthetic informative movements whilst immediately copying the kinaesthetic information.

Auditory information on the right beat coupled with visual focus on kinaesthetic movements is essential to understanding of the right form. In a combined endeavour of auditory and visual information, students process the musical material and the kinaesthetic movements. From understanding form to performing the right form, students start to employ bodily movements, based on previously observed bodily knowledge. In general, the students move from observation, prioritizing to focus on kinaesthetic movements, to active imitation of kinaesthetic movements, followed by self-monitoring their movements coupled with auditory confirmation. The only clear prioritization occurs when students locate a mistake. This predominantly takes place through self-auditory focus. It goes without saying that making a mistake is highly individual and often detected by the student's own ears. In the premise of this study, visual and kinaesthetic involvement consistently pertains to interaction with peers or teachers and therefor a collective endeavour. The very nature of mistake detection by the individual's ears determines clear prioritization of auditory focus in relation to melodic learning.

Melodic comprehension mainly bears on auditory focus. Interestingly, Table 5a shows that students of Moxi Delight have a more than twice higher chance to obtain a melody through auditory focus than without. Although this is stating the obvious, it demonstrates that during the first part of the learning sequence, students fully focus on isolated auditory information. Subsequently, students process auditory information which corresponds to a representation of the melodic contours in the perceiver. Further down the learning sequence, melodic acquisition benefits from the overlapping combination of auditory focus and monitoring of kinaesthetic movements of the teacher or peer. Students tend to imitate specific movements whilst simultaneously keeping visual focus on the information sender. During this final part of the learning process, students prioritize visual confirmation in order to locate the right movement coupled with auditory confirmation, succeeded by kinaesthetic involvement.

Finally, tempo requires an almost exaggerated form of kinaesthetic demonstration. In case of correction, students illustrate the appropriate tempo with clear bodily movements coupled with visual focus on their peers. In turn, the recipients first monitor the sender's kinaesthetic overlapped with listening to the auditory information, followed by kinaesthetic imitation of the right tempo. In general, the students start off with prioritizing a combination of observant auditory and visual activities to process the previously presented musical information. In the final phase, they predominantly focus on their own bodies in an attempt to align their movements with the dominant beat, prioritizing kinaesthetic learning over other forms of sensuous learning.

From the analysis of the acquisition of musical skills in the previous section, we can see three pervasive merging and prioritization modes emerge. First, consistently recurring in the analysis is the combination of auditory focus merged with visual focus. Built upon a constant auditory focus, students collect essential kinaesthetic information. This ubiquitous activity throughout the entire range of observed fragments hints at the importance of observation of kinaesthetic information. Earlier in this chapter, I questioned the prevailed way of musical knowing through the sensory experience of visual learning. By moving away from the ocular dominance of musical learning, that is, the dominance of music notation over intuitive, bodily learning, I assumed that the hearing, moving and feeling body would be at the centre of learning. From the analysis, I draw a more nuanced conclusion. Throughout the rehearsals, the students played by heart and music notation was only used in case of complex chord progressions or melodies. I came to the conclusion that musical skill acquisition is certainly dependent on visual focus. This is, however, not visual focus on staff notation, but rather the observation of gestures and movements of peers and teachers. To make this proposition more concrete, musical learning requires visual focus of the recipient, serving as an imagined musical performance before further active bodily participation. In sum, students prioritize observing bodily movements, illustrative of what they hear. This corresponds with theories

on mirror neurons (Cook et al., 2014; Fadiga et al., 1995; di Pellegrino et al., 1992; Jeannerod, 1994), human action observation (Calvo-Merino et al., 2005), and the role of musical imagery in musical learning processes (Cox, 2011) discussed in chapter 2. Upon building an auditory and kinaesthetic image, students move towards active involvement through literal imitation of the previously observed kinaesthetic information. During active involvement, students prioritize kinaesthetic movements whilst focusing on the other for confirmative purposes, at which point the young musicians acquire the musical skills at hand.

Differing from the first merging and prioritization mode, where learning seems to be a collective endeavour, is the second mode in which students employ self-regulatory learning tools to detect and correct their own mistakes. Locating mistakes generally occurs through auditory information. The prioritization of auditory information supports the students in detecting the mistake, whereupon they merge auditory focus on their own musical output with visual focus on kinaesthetic information from others. After individually processing this pivotal element of learning, they finalize the cycle by imitating the presented movements of others.

Not specifically discussed in the result section, but emerging from the generic sequences-analysis, is the specific role teachers or peers fulfil during the learning process. In the third mode, senders of musical information consistently merge auditory information with kinaesthetic movements. In all cases, the senders link sound with illustrative bodily movements in synchrony with either the melodic contours, the beat, or both. The third mode stresses the importance of merging auditory information with movements as a clear example from which the recipient can extrapolate essential musical information. Subsequently, music students then move from imagination of the musical performance to active kinaesthetic involvement.

Preparatory imagination followed by active bodily involvement, employed in this order, contribute to mastering musical skills. It appears that students run through both learning activities before acquiring a certain musical skill. Merging and prioritizing specific sensory activities while processing imagined kinaesthetic information, succeeded by conscious kinaesthetic imitation, often leads to mastering musical skills. In sum, conscious bodily involvement is a strong predictor of musical skills acquisition.

Conclusion

The importance of attending to bodily approaches in learning has been shown by convincing contributions from Alibali & Nathan (2012), Cook et al. (2008), Yang & Damasio (2007) and Glenberg (2004; 2008), demonstrating the importance of an intimate connection between deployment of the body and gaining abstract skill comprehension in mathematics or reading. In the context of this premise, I explored the significant role of the body in musical learning processes. Drawn from anthropology of the senses (Classen, 1997; Howes, 1991; Hsu, 2008) and sensory anthropology (Pink, 2009; 2011), I theorized the role of the body, and in particular the senses, as tools for musical learning. In effect, I first studied which forms of musical interaction and sensory tools young musicians deploy during a learning sequence. Second, I investigated how and when different senses were prioritized and merged into each other within these sequences. The exploring and moving body exchanges information through somatic modes of communication with other bodies (Howes, 2005; Jackson, 1983). To extrapolate on somatic modes of communication between learners, I borrowed Howes' (2005) notion of sensory relations. During interaction between learners, senses merge and are being prioritized depending on the action, apparently following a sequence. Bearing on Howes' merging and multi-directionality of the senses, coined as "intersensoriality" (Howes 2004; 2005), it stands to reason that young musicians merge and prioritize the senses to obtain specific musical skills. Hence, the final part of my analysis was to link intersensory learning to the acquisition of musical skills.

Embedded in a social constructivist view on education (Bur, 2015), the learning body understands the world through interaction. Rather than studying the bodily learning process of individual students, I moved from embodiment to emplacement, that is, the shift from knowing and thinking bodies perceiving the world through movement (Howes & Inglis, 2001; Turner, 1984; Shilling, 1993; Crossley, 1995; Howes, 2003; 2005; Leman, 2008; Leman & Camurri, 2006; Bowman, 2004; 2007) to the knowing and thinking body perceiving the world through individual movement, interaction with other bodies and the environment (Downey, 2007; Howes, 2005; Ingold, 2000; Pink, 2011; Shilling, 2003). In the context of this study, emplacement was divided in two analytical tools: 1) interaction analysis: studying the outcome of sensory learning and musical interaction forms in relation to musical skill analysis; 2) place-event analysis: studying objects, human socialities, and the nexus of events (ways of practicing and preparation for a rehearsal). The latter tool was contributive to contextualizing the learning body in its environment. I borrowed Pink's (2001) notion of place-event to account for the objects and rehearsal space, the musical background of the students, and the nexus of events. Both tools described how the learning body acquired musical skills through interaction with others.

This study has shown that students go through 3 types of learning sequences: 1) confirmation sequence; 2) correction sequence; 3) imitation sequence. Each sequence demonstrated how and when students deployed sensory tools and musical interaction forms during the learning process. During the first sequence, confirmation served as a form of interaction to contextualize specific musical parameters. By looking at kinaesthetic movements of other band members or peers, students gain essential information on a musical skill. Having processed this information, students deployed auditory focus on the musical material mostly through auditory self-correction, confirming whether they played the right notes. In the final step, students imitated the previously observed kinaesthetic movements and confirmed the acquisition of musical skills through bodily synchronization with the beat.

The second sequence started with the illustration of kinaesthetic movements to correct students during playing. Besides teachers sending kinaesthetic information, students also employed auditory self-correction. After the processing of either corrective kinaesthetic or auditory information, students imitated earlier observed bodily movements. Finally, they self-monitored their own movements and auditory information, moving in synchrony with the beat.

During the final imitation sequence, band members located mistakes first via auditory, followed by visual information. After processing either the contours of the sound or the visual image of the right musical parameter, students invariably finalized the third sequence with imitation of conscious kinaesthetic movements and bodily synchronization with the beat.

Based on the crosstab analysis and analysis of the episode reports as well as the interviews, I demonstrated how and when the senses merge, which senses were prioritized, and how musical interaction and sensory tools relate to musical skill acquisition. This study showed that chords and harmony comprehension largely depends on the prioritization of auditory focus. During the first stage of learning, students solely depended on their ears preparatory to visual focus on gestures and head movements, followed by the imitation of bodily movements. Obtaining cohesion depended on a blend of visual confirmation with auditory focus. After processing visual information of other moving bodies and concurrently confirming the dominant beat through auditory focus, students attempted to synchronize their bodies with their peers. The acquisition of cohesion is mainly attributed to conscious kinaesthetic involvement. Rhythmic acquisition was mainly confined in auditory information. Apparently, band members connected internal movement of their bodies to the rhythm at hand. However, mere auditory focus seemed to fall short in case it was not coupled with kinaesthetic involvement of the body. As for the effect on melody, the crosstab analysis showed that the deployment of isolated auditory focus significantly increased the likelihood of melodic comprehension. The perceiver first processed auditory information, which corresponded to a representation of the imagined melodic contour. Subsequently, students confirmed the auditory

information with visual focus on - and imitation of - kinaesthetic information from which melodic acquisition clearly benefitted. Finally, acquisition of tempo seemed to depend on exaggerated kinaesthetic interaction. Clear bodily movements, serving as an illustration of the beat, generally appeared to foster understanding and bodily imagination of the right tempo. Bearing on merged visual and auditory information, students imitated collective bodily movements in synchrony with the dominant beat.

From the analysis above, a confluence of auditory and visual learning emerged. In general, the band members prioritized the combination of visual and auditory focus in preparation of kinaesthetic imitation. The ubiquitous presence of merging and alternate prioritization of visual and auditory focus was followed by kinaesthetic involvement as a final sequential step before skill acquisition. This coincides especially well with theories on human action observation (Calvo-Merino et al., 2005) and musical imagery (Cox, 2011). These studies mainly discuss the embodied nature of the observation phase. Building upon these findings, I have demonstrated the importance of conscious rhythmic preparation and synchronization after the observation phase. Based on my analysis, it stands to reason that conscious and deliberate kinaesthetic synchronization fosters musical learning and the acquisition of musical skills.

Throughout chapter 3, I contextualized the ecology of learning and linked the outcomes of the interaction analysis to the place-event analysis and found three interesting relations between the musical background and the role of the teacher on the one hand and the acquisition of musical skills on the other hand. First, less advanced students generally seek for more confirmation than advanced players. They rely on observed kinaesthetic information before exhibiting the acquired musical information with kinaesthetic involvement. Second, there are significant relationships between imitation and the acquisition of rhythm and kinaesthetic involvement and the acquisition of cohesion for bands with strong leadership. This indicates that corrective teacher interference in the form of gestural and kinaesthetic information is contributive to musical skill acquisition. Third, for advanced players there is a strong relationship between imitation and tempo acquisition. The inculcation of instrument mastery is held to be conducive to increased collective learning. Instrument mastery determines the room for visual focus on other moving bodies and has a positive impact on tempo acquisition. Less advanced players, however, mainly focus on their own instrument, which obstructs the acquisition of tempo. This finding suggests that active synchronization with other moving bodies is essential to musical learning.

Inferred from the place-event analysis, I found three interesting relations between the musical background and the role of the teacher on the one hand and the acquisition of musical skills on the other hand. First, less advanced players are more dependent on confirmation in the form of gestures and kinaesthetic information than advanced players. Extrapolating data from the place-

event-analysis and linking it with the way less advanced players employed their senses and the body during the learning process, I found that these students rely on confirmative gestures and bodily movements from teachers or peers when they make a mistake. After a corrective repair they deployed kinaesthetic involvement and confirmed the acquisition with literally imitated bodily movements from the teacher or peers. Second, bands who were coached by directive teachers demonstrate significant relationships between imitation and rhythm acquisition and kinaesthetic involvement and cohesion. This suggests that students build their musical confidence on those who present clear beat markers. Subsequent imitation of this gestural and kinaesthetic information leads to quick repair of rhythmic and cohesive issues. Bands who are more self-directive were expected to filter out their own mistakes, usually through verbal corrections. In sum, I argue: the more kinaesthetic involvement of the teacher, the more kinaesthetic imitation by students, which leads to an increased chance of mastering rhythmic patterns and cohesion. Third, there is a strong relationship between the level of instrument mastery and synchronization of the body with other bodies. A significant relation between imitation of other bodies and the acquisition of tempo indicates that synchronization with peers depends on conscious imitation of bodily movements without that detracting from instrument mastery. In other words, they incorporated the musical material in their bodies. Students, however, who lack instrument mastery and commodification providing them with means to disrupt individual monitoring so that conscious collective cohesion can emerge, monitor their instrument in such a way that it often obstructs collective cohesion. In sum, These findings suggest that conscious synchronization with other moving bodies is essential to musical learning. Furthermore, it demonstrates the importance of multisensory learning with an emphasis on kinaesthetic involvement, especially for beginners level students.

Chapter 5

Implications for music education and beyond

Implications for music education and beyond

Introduction

Deliberate alignment of the body with the music lies at the heart of successful musical skill acquisition. As a result, the outcomes of this study challenge the pervasive cognitive paradigm of learning by offering a comprehensive analysis of the interplay between body-mind-environment in musical learning. The findings of the previous chapters shed light on the granularity of bodily and sensory experiences in relation to musical learning processes. In an attempt to move away from the paradigm of rational cognitive thought in education, embodied learning offers a more comprehensive learning experience in which learning is considered a continuous interplay between cognitive and bodily experiences. As Damasio (2000) argues, cognition is not a tangible thing, but a process. It is through the firmly embodied brain, grounded in processual bodily experiences, that we learn. Based on a towering body of evidence in support of the importance of awareness of the essential role of the body in learning and teaching (Bremmer, 2015; Bowman, 2004; Bowman & Powell, 2007; Yang & Damasio, 2007; Fenwick, 2006; Glenberg, 2004; 2008; Michelson, 1998), teachers should become aware of the essential role of the body in learning and teaching. The realization that the body and the senses play an indispensable role in the musical learning process has important implications for the way we teach music and design a curriculum.

This chapter strives to present research implications of this study in music education. I aim to connect my results from the previous three chapters with the actual practice of learning and teaching in formal and informal music education. The translation of my research findings into implications for education warrants closer attention. In the previous chapter, I had the tendency to sound rather firm in conclusions and statements about the relationship between specific forms of bodily interaction and the acquisition of musical knowledge and skills. I am, however, fully aware of the methodological limitations of this study. Both case studies in Kathmandu and Amsterdam were conducted in music schools in informal group-learning settings with a relatively small number of students. Indicative of informal learning is the emphasis on peer to peer learning with limited or no guidance of a teacher. Although my results on embodied learning are drawn from informal music school settings, I strive to translate my outcomes to more formal and teacher-centred settings as well. In many ways, the results of my study on acquisition of musical knowledge and skills through bodily interaction present opportunities for educational change through exploration of the body. Knowing when and how students deploy their body and merge sensory activities bears relevance to music teachers,

irrespective of the educational setting. A pedagogical shift, in which the body plays a central role in learning, might drastically change the curriculum and the way we teach.

This chapter constitutes recommendations for an embodied curriculum in music education. I will offer arguments for the introduction of embodied learning in the classroom against the backdrop of cognitive-based learning. To make the implementation of embodied learning more concrete, I outline what I propose are the key foundations of embodied learning and link the data of the interviews for this final chapter back to my findings on conscious synchronization and intersensory learning put forward in the previous chapters of this dissertation. Furthermore, I will present principles of teaching that constitute the didactical foundation of embodied leaning. Taking account of the challenging task of rigorous curriculum change, I finally explore possibilities and constraints for curriculum change and present some attainable embodied routes for teachers through network-building and sharing of good practices in arts education in general.

Cognitive learning

Before considering embodied didactics and curriculum changes, we should unpack the issues of the pervasive cognitive paradigm in which our education system resides. Under the influence of educational reformers such as William James, John Dewey, Jean Piaget, and L.S. Vygotsky, stimulus response and reproductive knowledge recall made way for constructivism. Nowadays, learning is widely considered an accumulative process of knowledge building on top of previously learned knowledge (Burr, 2015; Taylor, 2014; Tynjälä, 1999). Contemporary education, however, has been anchored in body-mind dualism and still views the body as an object to be controlled by cognition (Ovens & Powell, 2011). As I previously described in chapter 3, the association with learning as a purely cognitive endeavour impacted the whole spectrum of subjects and the curriculum design at our educational system, including music education. For example, Gordon's (2007) influential work on "audiation", in which he highlights aural perception without any physical support, renders the body elusive. His premise of learning with the mind is at odds with children's proclivity to learn through bodily communication (Barett, 2005). At the other end of the curriculum spectrum, mathematics didactics has also been subject to the cognitive paradigm. Due to its abstract nature, mathematics is considered the most disembodied subject in school (Landy, 2014). Abstractionist accounts in which cognitive processes are seen as disconnected from bodily action and perception dominate the agenda of mathematical learning and teaching (Glenberg, 2008). Despite ample evidence demonstrating a causal link between bodily action and the gain of mathematical skills (Andres, 2007; Cook, 2008; Lindemann, 2007, Sato, 2007), embodied strategies of learning are not anchored in contemporary school curriculums. Rather, mathematics is taught as "cognitive manipulation of

abstract symbols by rules" (Glenberg, 2008: 359). Both accounts in music and mathematics are exemplary for a pervasive educational avenue celebrating the mind over the body and could leave the learning potential of students untapped.

Aware of the challenging mission that educators should account for the essential role of the body in learning, I demonstrate three constraints I consider to be potential obstacles to the implementation process of embodied learning in music education. First, the emphasis on spoken language as the main vehicle of communication and knowledge transmission in the current education system is at odds with findings in other studies claiming that children prefer non-verbal modes of communication during the musical learning process (Barrett, 2005). Later in life, students display the same proclivity towards bodily communication through modelling, gaze, gestures, bodily movements, and motion (Barrett, 2005; Bowman 2004; Davidson, 2005; Rogoff, 2003). In chapter 3, I demonstrated that during the correction sequence, teacher-driven correction was often associated with verbal communication. Often, teachers tend to replace the flow of playing with verbally explained musical information. Immediate musical imitation based on verbal input proved to be an insufficient source of information for the recipient. Preferences from students for non-verbal communication became evident in my research. Rather than breaking the flow of learning by verbal communication, students fall back on gestures and entrainment to either correct mistakes or solidify a contagious groove. This participatory form of learning hinges on "music in action" (Barrett, 2005) instead of music through talking. A more effective way of correction occurred through gestural and kinaesthetic illustration of the musical material. This enables the student to instantly implement the observed movements whilst playing. Evidently, I recognize the importance of language as a vehicle to fabricate knowledge (Burr, 2015; Gergen, 1995), but we fall short if we fail to include the body as a precondition for learning. Musical learning requires more than the linguistic transmission of information. Students depend on bodily communication from which they distil the right musical information. Taking account of the insufficiency of spoken language as the sole learning tool and complementing it with deliberate gestures and bodily movements, as I demonstrated in chapter 2 and 3, is essential to the successful implementation of embodied learning in the music classroom.

Second, besides spoken language, written language dominates learning material. Consequently, teachers base their didactics on textbooks from publishers, which often results in transmission of knowledge via written texts. Studies in the educational fields of language, and music, however, have raised concerns about the cognitive approach to acquire written language. For example, the indexical hypothesis describes when children shift from spoken language to written language they haphazardly decode the symbols into sound without indexing the symbols into grounded representations of their material world. It explains why children find it difficult to give meaning to written symbols through cognitive learning without solid grounding of symbols through

sensorimotor actions (Glenberg & Robertson, 1999, 2000; Glenberg & Kaschak, 2002). This hypothesis recognizes three phases to successfully understand a written sentence. First, indexing words allows for the connection between phrases and words with perceptual symbols or real objects in the material environment. During the second phase, children deduce affordances from the indexed objects or perceptual symbols. In other words, they consider the possibility of their actions on the described objects in the environment. Finally, they mesh or integrate the affordances and account how the abstract symbols can be combined with sensorimotor actions (Glenberg, 2008). This process describes the importance of grounding abstract symbols into real life experiences. It demonstrates that mechanisms of joint attention are essential to the learning process of written language acquisition.

Cognitive language fixation without the grounding of symbols into experiences or objects has a notable effect on music education as well. In chapter 3, I questioned the prevailed way of musical learning through reading. Music notation is often considered essential to learning music. During a child's musical journey, bodily intuitive exploration is replaced by static cognitive knowledge through the systematic ordering of sound into symbols. The attribution of tacit knowledge to symbols, as if a written note is the actual bearer of sound, wipes out the spontaneous and innate proclivity to learn through imitation and bodily movement (Bamberger, 1996). In other words, staff notation is nothing more than a unit of description. Understanding staff notation is contingent on a habitual association between the music sign and the musician (Treitler, 1982). The signs only reveal their information when the referent is putting effort into the encoding process by learning and practicing. I do not question the importance of musical literacy, but prioritization of reading is at odds with children's favourable disposition to learn through imitation and movements. When it comes to learning to play an instrument, music often starts with written notes on a piece of paper. Most children are subject to music lessons aiming at translating staff notation to sound. Embodiment is completely erased from this process. Notation has merit in a later stage of musical learning, but conveying a musical message through staff notation is only possible to a limited extent.

Third, bodily constraining spaces and environment factors can be harmful to learning. The fabric of a classroom with desks and limited space to move, does not take into account the essential role of the body in learning. On the contrary, sitting behind a desk literally constraints the body and gears towards cognitive learning. Aside from physical constraint, ambient sound, high levels of carbon dioxide, short-run changes in temperature, and a falling light level significantly harm children's performance rate (Zivin, 2015). During an education seminar (Bett London) I visited in 2017, Heppell brilliantly pointed out that our knowledge to design classrooms to limit learning-loss dramatically lags behind in comparison to our capability to design classrooms for the least possible heat-loss (Heppell, 2017; see also Higgins, 2005). Both factors, the environment and physical

constraints, influence children's capability to learn. Therefore, we need to consider changes in the learning environment. There are too many constraints in a school building. As long as we stick to traditional classrooms, we are not going to cater to the needs of students. Unless we go for open and spacious music classrooms. It is an absolute prerequisite to have space. Admittedly, you can do a few limited movements behind a desk, but that will seriously limit children's musical experience.

In sum, to make the first move towards embodied learning, teachers should recognize the limited effect of verbal communication and staff notation during the musical learning process in conjunction with creating open spaces –depending on the needs of the students – where they can deploy their body in the learning process without hindrance of constraining environmental factors.

Method

In an attempt to bring my research and educational practices together, I conducted seven semi-structured, in-depth interviews with various stakeholders in the field of arts education, innovation in education and related policy. Semi-structured interviews resemble daily life conversations and provide a great deal of leeway for respondents to reply (Bryman, 2015). Hence, qualitative interviews are particularly suited to grasp the rationale behind curriculum design, didactical choices of teachers, the multifaceted ways of bodily learning, and educational policy making. To provide optimal access to the rationale behind embodied practices, the seven interviews took place on the work locations of the participants of this study. Interestingly, this particular setting was often used by the respondents to simulate embodied practices.

Each interview took approximately 1 hour. During the interviews, we first discussed the enriching possibilities of embodied learning within the current cognitive paradigm. Second, the music experts were asked to reflect on the use of the body to convey information during the learning process. Furthermore, I inquired into the mapping of students' bodily and sensory learning. Besides reflecting on their education practice and discussing the outcomes of this study in relation to their embodied practices, we considered the possibilities of an embodied curriculum. Finally, we discussed the possibilities of translating the results of this study into curriculum changes and education policies.

After verbatim transcription of the interviews, I explored the data on themes which yielded arguments for embodied learning, foundations of embodied learning, didactics of embodied learning, and curriculum change. In an attempt to demonstrate the practical implications of my study, I connected the interview data to the results of the previous chapters of this dissertation.

To translate the outcomes of my research in informal settings to formal education, I selected 3 interviewees based on their experience in the field as music teachers. Their active involvement in the daily practice of music teaching and training of teachers sheds light on possible embodied practices of teaching. First, I interviewed Ton Hordijk, a general music teacher at a secondary school in Rotterdam with over two decades of experience. His music classroom is very spacious and allows for the body to move freely. The students are incentivised to explore various musics with or without music notation. His music education philosophy rests on the conviction that music education should be fun and accessible, regardless of prior musical knowledge. The second interviewee was Roosje Blenckers, head education at Aslan music school in Amsterdam. She is a convinced and passionate advocate of non-verbal teaching. Driven by a direct need to challenge the disembodied paradigm of learning and teaching, Roosje designed a methodology for music educators aiming at combining musical activities with movement at all time. The result is a happy confluence of music and dance

without words, catering to an array of different learners. The third interview was conducted with Leo Molendijk, head of the music education department at Codarts University of the Arts in Rotterdam. He acknowledges that the curriculum at the conservatory is premised on the dominant assumption that learning is a rational cognitive thought process. At the same, time Leo criticized learning as an exclusively cognitive process. In his assertion that learning a rhythm should be bodily and internally experienced, he proposed to update the curriculum with a new rhythm course, reclaiming a pivotal role for the body in the learning process.

For this study, I selected one recently graduated composition student form Codarts University of the Arts in Rotterdam, Abhisek Bhadra. At the time of conducting field work in Nepal for the first chapter of this dissertation, Abhisek was preparing for his audition for Codarts. More than 5 years later he looks back on how his formative years of learning music within the oral tradition of Nepal influenced the way he deployed the body during the learning process within a formal notation focused conservatory setting.

The fifth interviewee was selected for her experimental work on embodied learning and could provide insight in the ways educational changes could be implemented. In the capacity of a concept designer and educational developer at Waag Society Amsterdam, Meia Wippoo proved to be my only respondent fully immersed in the concept of embodied learning. She supervises the Creative Learning Lab of Waag Society, researching how intellectual ways of teaching may be coupled with involvement of the body. In this lab, Waag Society experiments with embodied learning games fostering language and math skills.

Finally, I chose two policy advisers from the Ministry of Education, Culture, and Science in The Hague to gather data on arts education policy and possibilities for dissemination of my own research results. Besides working as policy makers, Siela Jethoe and Wim Burggraaff both occupy positions as teachers at a university of applied sciences. On my inquiry to disseminate the findings of this research, they offered the option to share my findings at a learning community for researchers and teachers to consolidate educational competencies of teachers and cultural employees in the field of arts education.

Arguments for embodied learning

The emergence of the moving body in the classroom proves to be a common denominator for the interviewees in this chapter. Albeit not always directly linked with or drawn from theories on embodied cognition or embodied learning, they most certainly exercise elements of embodied learning in the classroom. All respondents share a similar vision on the pivotal role of the body in learning. As theorized before in the section on cognitive learning, the interviewees are very critical of the dominant cognitive paradigm in which the transmission of facts from teacher to brain constitutes the learning process in many music classrooms. To engage with the complexity of educational changes required to critique the dominant trajectory that privileges the mind over the body, I put forward two arguments for embodied learning in the classroom.

First, the use of gestures and bodily movement during the learning process is essential to maintain the gain of knowledge and skills, regardless of the abstract nature of the subject. Children absorb culturally specific musical information through non-discursive bodily interactions with peers and adults in the form of gestures, bodily movements and motion (Barrett, 2005; Bowman 2004; Campbell, 2001; Davidson, 2005; Dissanayake, 2000; Green 2008; Rogoff, 2003; 2011; Rice, 2001). Non-verbal behaviours play an essential role in musical learning processes and seem to have a significant impact on the effectiveness of teaching (Simones, 2015). A similar analysis is found in studies on mathematical learning, presenting evidence that the deployment of gestures significantly supports the learning process of abstract symbols and imbues them with meaning through embodied actions (Alibali, 2012). The use of problem-relevant gestures in mathematics are more likely to maintain learning gains than merely using verbal transmission of knowledge (Cook, 2008). The findings in language, music and mathematics education all point to the same conclusion: there is a strong connection between bodily actions and the acquisition of knowledge and skills. Along this line we can extrapolate this important finding to the educational arena in general. The current system serves children who have enough cognitive capability to learn through the application of cognitive and abstract learning. Consequently, this way of learning and teaching leaves those who are termed low achievers behind. Roosje (head education at Aslan music school) advocates for inclusiveness:

> *"Allowing for more bodily ways of learning simply caters to all students, regardless of their cognitive capabilities."*

Meia (De Waag Society) continues:

> *"Besides, offering alternatives to cognitive learning, we challenge children who thrive in the current system by new ways of learning that are not necessarily self-evident for them."*

The arguments of *De Waag* and *Aslan music school* that all children benefit from bodily learning are in line with previous claims on preference for non-discursive learning put forward in chapter 2. In this regard, I emphasize that learning through bodily action is intuitive, easily accessible, effective, and recognizable for all children, regardless of their cognitive performance.

Second, music and movement form an inseparable unity. As demonstrated in the previous chapters, we are innately wired to move to the beat and entrain our bodies with others. We possess an implicit understanding of patterns of bodily movements during music making (Clayton, 2008). For example, during music classes most students are automatically drawn to the beat and often sway their bodies or tap their feet accordingly. This natural confluence of music and movement constitutes the didactic mainstay for Aslan music school. Aslan's philosophy of learning rests on the foundation of teaching songs in combination with playful movements. In an attempt to move away from verbal teaching, teachers at Aslan give as little instruction as possible to foster children's proclivity to learn through movement. Therefore, songs are always learned through dance and gestures. In a similar vein, Leo (Codarts) argues that some students have a cognitive understanding of a syncopated rhythm without the capability to perform it successfully:

> *"Sound and rhythm should be continuously combined with movement. What do we gain from that? Above all, more melodic and rhythmic comprehension which facilitates the learning process and leads to a fully embodied performance."*

During his music classes, he often encounters students who are rhythmically disorientated. Consequently, students lose track of the dominant pulse and are inevitably drawn to the syncopated rhythm. This phenomenon, termed "unconscious synchronization" in this research, is the result of limited rhythmic awareness. As I demonstrated in chapters 2 and 3, students who do not combine music with movement and fail at deliberately synchronizing their body with the dominant beat often have difficulty performing a syncopated rhythm.

On the subject of music and movement, Abhisek explains that he didn't receive formal western music training, but was immersed in Nepali music from childhood onward. Oral transmission, the observation of gestures and imitation of bodily movements on the beat are indicative of the immersion process in Nepali music, as demonstrated in chapter 1. Deploying his

intermusical skills, Abishek merged local music skills with unfamiliar learning strategies and music skills at the conservatory. He elaborates:

> *"Because I wasn't trained at a conservatory, I relied on what I knew. It was based on very little sheet music. More on gestures and bodily repetition and oral tradition. That was 5 years ago. Now I am graduated and I still resort to those methods. At the same time, I am immersed in western sheet music. I combine sheet music, gestures, listening, singing and movement to convey my message."*

It is incredible to see, both as a researcher and as his former piano teacher in Nepal, how Abishek is now fully equipped to blend both of his musical worlds. He harnesses intuitive gestural and bodily learning in conjunction with formal musical knowledge and skills. For him, music and movement are inextricably connected. As demonstrated in chapter 1, intermusicality is the result of merging musical worlds, leading to the acquisition of unfamiliar music. In blending his musical worlds and learning strategies, he recognizes the pivotal role of the moving body as a tool to acquire novel musical skills. This reinforces an important implication for music education: music is not learned through a distinct set of separate musicalities (O'Flynn, 2005), that is, intuitive bodily learning or cognitive and theory based learning, but acquired through active blending of both musical worlds.

Foundations of embodied learning

Successful implementation of embodied learning hinges on two foundations. The first one is conscious synchronization. Awareness of the body and deliberately deploying the body in synchronization with the music is essential to musical skill acquisition. The second foundation is intersensory learning. Students tend to prioritize specific sensory activities depending on the task. Knowing when and how to deploy sensory activities is beneficial to the musical learning process of students.

Awareness of the body

Evidence in this research points at the pivotal role of conscious synchronization. Once the body is consciously aligned with the dominant beat, acquisition of musical skills often follows shortly after. I inquired into conscious bodily movements by asking my respondents about the level of awareness when deploying conscious movements during teaching and the place of conscious movements in the didactics of teaching and learning. In a genuine attempt to reflect on the conscious deployment of the body, Ton (music teacher) points out that he often energetically exaggerates his gestures and clap movements:

> *"Basically, it all boils down to call and response with exaggerated movements. If they copy those movements it often suddenly clicks. Merely saying 'this note arrives at the after beat of the 3' is never sufficient."*

To the question if conscious imitation of movements leads to quicker acquisition, Ton responds:

> *"I didn't really consider that before to be honest. Notwithstanding, I do clearly see that inviting my students to copy my movements supports the learning process."*

During the interview, Ton vigorously demonstrates how he teaches his students a syncopated rhythm. His feet move up and down at the beat while he squeezes the syncopated notes through the cracks of the dominant pulse. He explains why this theatricality is essential:

> *"Many students do not feel the dominant beat automatically. They often fail to use their feet. You have to make them aware of the beat. We can do that through conscious tapping and clapping."*

The above demonstrates the importance of teaching beat awareness through bodily transmission of beat indicators. Provided that students do not synchronize their bodies with the dominant beat, clear demonstration of the beat followed by imitation is imperative.

Moving from a teacher-transmitted form of correction towards self-correction, Abishek explains how he consciously deploys the body during the learning process:

> *"As soon as I make a mistake I look at the music, play with the metronome, take a step back and do the whole body thing: beat with my left foot and sing the rhythm. I do it as a correction and not in the beginning. It is something to be mindful about. I should consider it as part of the process. I use it [the body] as a correctional device."*

It is interesting at this point to see that Abishek initially stresses the role of the body as a correction device. He outlines how the body moves from unconscious to conscious. Only after he detects a mistake, the body is consciously introduced. This form of correction resides well within the self-correction sequence presented in chapter 3. Self-correction, used to minimize pervasive mistakes, starts with auditory awareness. Upon detecting a mistake, visual confirmation of the right bodily movement is sought, followed by kinaesthetic, synchronized bodily movements. Self-correction happens to be a useful and crucial feature in the learning process. Critically, Abishek points out that every student faces different challenges. We do not always know the problems beforehand. I fully agree with his remark. Self-correction will not become obsolete due to constant bodily awareness as mistakes are natural to learning. At the same time, consideration of conscious bodily deployment as part of the whole learning process leaps over some fundamental and pervasively recurring problems, including a-synchronous movements on the beat. Abishek admits that he failed to master complex rhythms in case of bodily unawareness. I argue that firmly grounding the body in the beat combats frequently occurring musical problems such as acquiring complex rhythmic patterns.

Intersensory learning

Understanding when and how students deploy their senses during the learning process helps us to attune our gestures and bodily movements to the needs of students. For example, if students privilege the visual input of kinaesthetic movements to locate the right rhythm of a chord progression, as demonstrated in chapter 3, teachers should meet this dependency on visual information merged with imitation of kinaesthetic movements with clear and exaggerated bodily instructions. Pursuing to stack my data on intersensory learning against the musical practice of my

respondents, I learned that disclosing merging and prioritization modes of the senses seemed a particularly challenging job for the teachers. Foremost, a teacher cannot possibly search for conclusive answers on blended sensory activities in a crowded classroom of 30 students. In addition, searching for recurring patterns of merging sensory activities and the tendency to prioritize specific senses depending on the musical task is very precise and clerical work, as I experienced during the analysis of my data for this research. Nonetheless, the respondents were able to provide me with some broad strokes on what they discerned as patterns of sensory prioritization and merging.

Since the teaching method of Aslan Music Center considers music and movement as inseparable, Roosje points out that in conjunction with auditory information, visual input through gestures and facial expression invites children to participate. She is convinced that the senses operate together, but for embodiment of the dominant beat she found that children often prioritize the visual input of the teacher's expressive movements. Consequently, teachers at Aslan Music Center deploy expressive mimicry to convey their musical message. This serves as a visual and auditory base for the children to enter the kinaesthetic stage of learning. During the latter stage, the children mimic the expressive movements whilst firmly grounding their bodies in the dominant beat.

Asked to reflect on sensory modes of learning, Ton (music teacher) provides me with a detailed description of the way he conveys musical information and when students prioritize and merge certain senses depending on the musical parameter. For example, acquiring a groove or cohesion is in the first instance primarily auditory. According to Ton, the students tend to face the sheet music or gaze undisturbedly at their fingers pressing the instruments. In case of failed rhythmic cohesion he turns up the volume of his piano and plays untastefully loud. The auditory information serves as a proxy for the written notes. The sheet music itself is uninformative about cohesion and staring at notes only exacerbates cohesion failure. Hence, a loud auditory correction is required to enforce cohesion. Ton instinctively couples auditory information with exaggerated movements on the dominant beat, accompanied with counting out loud. He detects a recurring pattern in this learning process:

> *"Right after the auditory correction, the students automatically look at my movements. This seems to support them. Some of my students attempt to copy those movements and sway on the beat. Most students are, however, not in sync with the beat"*

Drawn from the quote above, most students are able to merge auditory information with visual focus on the teacher's movements. In chapter 3, a similar pattern emerged: students embark the learning process on a blend of auditory and visual information succeeded by imitation of kinaesthetic information and ongoing observation of those movements. The final step, the imitation of

kinaesthetic movements, that is, conscious synchronization of the beat with the body, is the most challenging part of the learning sequence. Students who get rhythmically lost are, aside from visual kinaesthetic input, in dire need of physical guidance. A remedy to unconscious synchronization for even the most challenging students to teach is a felt and physically experienced beat. According to Ton:

> *"I have a student singing and accompanying herself on the piano. The moment she taps her foot out of sync and turns rhythmically unstable, I tap the beat on the piano. At first, she listens and then she starts swaying her body in the right pulse."*

After absorbing the visual and physically experienced beat – she feels the vibrations of the dominant beat in her fingers through the loud tapping on the piano – the student enters the final part of the learning sequence in which she correctly aligns her body with the beat.

An equally helpful correction tool, other than the indirect felt beat though a medium like tapping on a piano, is direct physical guidance. For most students, the musical learning process is strewn with challenges, of which I hold a-synchronization of the body mainly responsible. Direct bodily contact can be a highly efficient in combatting a-synchronization. Leo (Codarts) exemplifies:

> *"In my opinion, correcting for asynchronous movements is certainly a physical matter. For example, it can be very helpful to tap the beat on someone's shoulder."*

In addition to my aforementioned blend of auditory and visual observation succeeded by imitation of kinaesthetic movements, I propose a directly experienced beat. Aside from merging visual and auditory senses followed by autonomously deployed kinaesthetic movements, for which the risk of failing to synchronize is significant, touch should be part of the blend of senses. Within the confine of this study, touch was considered essential to embodiment (Patterson, 2007). Direct touch, as in touching the body with tapping beat markers, did not occur during my fieldwork. Therefore I subsumed touch under kinaesthetic movement, operationalizing touch as cutaneous pressure of the fingers on an instrument or the swaying body on the beat, firmly grounding itself. So far, "reciprocal anthromorphism" (Jackson, 1983: 137), that is, the interactive transaction between moving bodies, was based on auditory and visual observation. Albeit conjectural at this stage, merging auditory and visual information with literally felt cutaneous pressure on the shoulders for example, has the potential to effect changes in the way the a-synchronous body relates to the beat. As became evident in the learning sequences presented in chapter 3, teachers and students latch onto observation and imitation of gestures and bodily movements during the transaction process of

musical information to acquire musical skills. If touch, within the professional boundaries of teacher-student interaction, could prohibit the body from a-synchronous movements, it is worth investigating if directly felt beat markers on the body might yield immediate results on the synchronization process of the body with the music. A confluence of auditory learning, visual learning, and corrective touch could be an additional way of couching the challenging and inspirational issues of embodied learning.

The didactics of embodied learning

During the learning process, students gain awareness of their musical capabilities and limits that often present themselves as bodily inhibitions. Remedy to musical inhibitions is a safe space where students can explore their musical capabilities in an individual setting without immediate exposure to their peers. Teachers should carefully consider the ways embodied learning is introduced in a classroom. In this paragraph, I offer didactical suggestions for embodied learning for both formal and informal music education. Organized around two core principles, I will present didactical approaches to create a safe space to learn and propose habitual training for teachers.

Successful implementation of embodied learning in the classroom hinges on carefully educed embodied didactics. Against the backdrop of formal education, where students spend the bulk of their time on processing top-down transmitted information, which disincentives an active body, we cannot expect students to immediately feel comfortable with a moving body. To help gradually adapt cognition-based teaching styles to embodied learning, I identify two pivotal principles that constitute the didactical foundation for embodied learning and teaching. First, in order to engage in the learning process, teachers bear the responsibility to establish a safe space to learn. We have to keep in mind that clapping and moving in front of teenage peers might be met with mockery and can be quite confrontational. Where Aslan's approach of non-verbal teaching corresponds with children's proclivity to move and play, music teachers in secondary schools face a challenging age group consisting of young adolescents. For that reason, prudence is called for when introducing embodied learning during collective learning. We should divert from collective embodied learning that might induce fear for failing. Music teachers could for instance introduce embodied learning individually or in smaller groups. Albeit logistically challenging due to the collective nature of music teaching, teachers could create instances in which they offer a one-on-one or a small group situation for optimal and safe exploration of bodily learning. For example, this could happen while the rest of the class is working on another assignment or musical task. Music classrooms are often considerably spacious and offer possibilities for learning differentiation. By recommending one-on-one or small

group attention between teacher and student, music teachers offer a safe space to bodily explore and at the same time facilitating to seek out opportunities to make mistakes in front of a patient person might incentivize students to actively employ the body during the learning process without inhibitions.

Second, embodied learning is a matter of training. Teachers should habitually correct for a-synchronicity through kinaesthetic movements as part of the daily musical coaching. Learning to align your body with the beat requires time, effort and conscious bodily involvement. Students should not only tap a rhythm with a pencil on their desk. By doing that they only cognitively know the duration of the notes and have no internal and bodily experience of the rhythm. Asked how to master internal experience of rhythm, Leo (Codarts) exemplifies:

> *"One of the teachers at the Latin department requires students to walk on the dominant beat. On top of that solid base they perform complex rhythms. Learning a rhythm should be internally experienced."*

In congruence with my research in which I advocate for a firm grounding of the body on the dominant beat, Leo proposes to shift the focal point of rhythmic learning from cognitive to internally experienced, thus embodied. Stripped down to the bare essentials, it shouldn't be too complicated to implement this new focal point of harnessing the beat in the body before embarking on a complex rhythmic journey. Lurking in the details, however, there are some challenges ahead. The didactic principles of many teachers are firmly rooted in cognitive teaching and learning. In many senses, it is more habitual for teachers to start from the cognitive information of a particular rhythm than it is to start from the felt beat in the body. If we were to take seriously the potential of embodied learning to affect change in musical skill acquisition, teachers should come out of their comfort zone and be willing to search for possibilities of introducing the body in learning. Like all didactical changes, the potential success of embodied learning relies on the eagerness of teachers to critically re-design their way of teaching. For teachers and students alike, shifting from cognitive to embodied learning might feel uncomfortable at first. A safe space to learn and train approximates what is already intrinsic to human beings: the moving and playing body.

In the development of fully embodied teaching, Roosje from Aslan Music Center has formulated a specific teaching method based on non-verbal learning. When I hypothesize that teachers and students should become conscious about when and how to deploy their body in the learning process, Roosje responds:

> *"Conscious movements should always be at the base of teaching. Before the class*, a *teacher should prepare how to combine specific bodily movements with the musical task at hand. Randomly choosing your movements on the spot is far from desirable."*

Because Aslan advocates for conscious deployment of the body in musical learning, a training methodology was the logical subsequent step:

> *"We train our teachers to consciously use the body. Since many teachers revert to cognitive learning by default, we have to re-educate our new teachers."*

These training sessions aim at a deeper understanding of the inseparability of music and movement. The teachers learn how to maximize the use of bodily movements and minimize their use of language. They experience first-hand how it feels to freely move through an open space whilst aligning their bodies to the beat under the guidance of non-verbal communication. Since formal learning privileges the mind over the body, some teachers have to correct for their cognitive default teaching mode through conscious awareness of when and how to deploy the body during teaching. Evidently, this approach rehabilitates and revitalizes what has already been firmly rooted in our musical bodies since childhood.

Once the students are seen as embodied learners in constant interaction with themselves, other learners and a safe learning environment, embodied curriculum building can start. In chapter 3, I discussed the concept of "emplacement". Entangled with the environment, the body learns via movements and sensory interaction with its material environment, including objects and human socialities (Pink, 2011). The salutary shift of attention from the dual relationship between body and mind to the triangular relationship between body-mind-environment (Howes, 2005; Pink, 2011) provides valuable insights for embodied teaching and embodied curriculum building. Ubiquitously, my respondents argued for open and safe spaces to learn. The body should be allowed to move freely, explore and by no means be hindered by social factors such as peer pressure or environment factors such as architecture, humidity, noise, and light that are detrimental to learning (Higgins,2005; Zivin, 2015). Assuming that limiting environment factors are eliminated, students should be challenged by - and immersed in - their social and material environment.

Connecting, Co-creation, and Networks

Rather than implementing some elements of embodied learning, we should adopt a more rigorous didactical approach and curriculum changes to yield effective results in learning. For embodied learning to be potentially effective for the acquisition of musical knowledge and skills, consciously deploying the body ought to be part of the daily routine of teachers and students. The effect of one teacher using embodied learning as a didactical tool is negligible. Only if the daily menu of knowledge and skill acquisition consists of embodied elements in teaching and learning, results might be noticeable in the way students absorb and master knowledge and skills. The first section of the final chapter concerned possible research implications for music education. For the benefit of music teachers in formal and informal settings, I geared my recommendations on embodied learning specifically towards musical skill acquisition. But driven by the conviction that knowledge and skill building does not happen in isolation, I take on the task of exploring the benefits of cross pollination between various courses in this final section. I close by considering possible obstacles and solutions for the introduction of embodied learning in the field of arts education in general.

To develop a learning environment in which embodied learning becomes habitual, courses should be connected in one way or another. Most music schools or cultural centres offer a curriculum that is vertically designed. Each course has a different teacher with a strictly formulated curriculum and limited connection with other courses. My respondents unequivocally advocated for a stronger connection between courses. Rather than the vertical separation between subjects, in which information is presented within the context of one particular course, horizontal teaching offers a crossover between courses in a broader context. Roosje (Aslan Music Centre) describes the benefits of horizontal teaching:

> *"We [Aslan Music Centre] also connect music with languages and mathematics. There are fantastic math games combined with movements. I remember one of the students saying: Wow, we just learned these arithmetic exercise with this teacher and now we do the same with this teacher, but then with a dance or some music."*

Once the exercise is learned in one course, the students immediately launch into another course with the same material, but learned from a different angle. This approach is beneficiary to knowledge and skill acquisition as it repeats the same information in an embodied way. As a result, the information solidifies within the body of the learner. Furthermore, the information is no longer compartmentalized, but falls within a broader context of learning. Siela from the Ministry of Education, Culture and Science advises in her role as a teacher:

> *"View your students in a larger context, rather than only transmit your knowledge in your course. Dare to change things and exploit your autonomy under the guise of educational maneuverability. Do not work from the given educational frameworks, but design your own education and see where the given framework fits."*

Having an educational philosophy is one thing, but actually changing your own education is another. It requires to break free from old routines. Therefore, Meia (De Waag Society) proposes to work together as teams:

> *"Educational change is dependent on experience. You can tell that movement is essential to learning, but as long as a teacher does not experience that first hand, convincing is futile."*

Meia offers an interesting framework for successful educational changes. She explains that even genuinely interested teachers who actively look for new ideas often fall back into old habits and remain transfixed in the familiar. Breaking these routines, however, is the most challenging part of educational change. Teachers and students are more likely to break their routines and embark on an embodied journey if they have experienced the effect of embodied learning on knowledge and skill acquisition. Evidently, using the fertile grounds of the classroom for embodied experiments and experiencing the effects of embodied learning on knowledge and skill acquisition is likely to demonstrate teachers and policy makers its educational worth (Glenberg, 2008). Moreover, teachers and students should be part of the designing process of the embodied elements in the curriculum. For instance, *De Waag Society* always involves the stakeholders in their embodied experiments. It is through co-creation that teachers and students are actively involved in the educational changes ahead. To fuel educational change, a growing number of scholars move the experience of the body to the centre of learning (Ellsworth, 2005; Glenberg, 2008; O'Loughlin, 2006; Osmond, 2007; Pillow, 2000; Perry, 2011). Bodily interaction and experiences are the key processes through which the learners represent themselves as well as create new learning experiences with others (Ellsworth, 2005). In recognizing the involved and active body as essential for educational change and learning in general, scholars are indebted to the findings of one of the most influential reformers of formal education: Dewey (1916):

> *"give pupils something to do, not something to learn; and the doing is of such a nature as to demand thinking, or the intentional noting of connections; learning naturally results"* (p. 181).

From Dewey's (1916) account on the significant role of the doing body, via Montessori's (1967) educational system centralizing the moving body to contemporary school systems[16] in which the body is allowed to experiment through playful learning, the celebration of the learning body emerges as the common denominator. In line with the foundations of embodied learning, where learning is the result of processual bodily experiences, learning with active and physical elements feels "relevant, exciting, and empowering" (Salen, 2011: 10).

Connecting subjects and fuelling change through bodily experience and co-creation are essential to successful educational changes. Much, however, remains for us to consider in terms of possible obstacles for the introduction of embodied learning in arts education. Wim and Siela (Ministry of Education, Culture and Science) present two possible constraints for educational change within the field of arts education. First, teachers experience a lot of pressure to go through the whole program in the curriculum. Therefore, they often do not see any room for change. Subsequently, transmission of knowledge within the familiar framework is more likely to happen than progressive methods like embodied learning. Wim points out:

> *"It seems that teaching has to be done in one way within the confines of the curriculum. In the Netherlands, however, schools have autonomy over their program and methods of teaching. They are only required to prepare the students for a state exam. When there is too much focus on the cognitive aspect of learning, teachers run the risk of jeopardizing creativity."*

Despite this autonomy, teachers do not always experience their freedom. Conceivably, the pressure of successful results determines the room for exploration of new forms of teaching and learning. Second, there is a lack of organized networks within arts education in which teachers experiment with new forms of education. Seila is slightly apprehensive about the sustainability of educational change if progressive initiatives are dependent on a few frontrunners:

> *"There is of course a danger in depending on a few progressive teachers. The bulk of teachers try to survive. In some cases arts education can be exemplary for educational change. But*

[16] Contemporary school systems like *Quest to learn* attempt to combat spoon-fed education (http://www.q2l.org/). Salen (2011) inquired into the idea of re-thinking school as a learning space that spans onsite and offsite, digital and physical, collaborative and individual, teacher-centred and student-centred. The student of *Quest to Learn* learns by doing. The learner is active, experimenting, and validating theories through playful learning.

truth be told, exemplary arts education projects are heavily reliant on progressive teachers who really commit."

In order to make progressive initiatives in the arts less reliant on a few frontrunners, the Ministry of Education, Culture and Science facilitates a new initiative called "leergemeenschappen" (learning communities). The aim of these communities is to consolidate educational competencies of teachers and cultural employees in the field of arts education (OCW, 2016). During these sessions, teachers and cultural employees share best practices with the goal of contributing to qualitative arts education, including pedagogical and didactical skills, and general skills in the arts. Inspired by the potential of these learning communities, I already reached out to disseminate the findings of my research during a series of sessions I will organize on embodied learning. Besides sharing the outcomes of my study, it is my aim to translate my findings into concrete didactics. To suit the action to the word, I recorded my first Podcast on embodied learning, aiming to make the outcomes of this research more accessible to a wider audience[17]. Together with students and teachers we will work in co-creation towards the introduction of embodied learning as part of the daily routine. These learning communities offer the perfect platform for bringing my research into actual practice for the field of arts education.

Arts education has the potential to serve as a crowbar for change and a stimulant for innovation. Sometimes teachers should dare to let go of methods and books and let the interest of children be leading. This naturally involves an exploratory and moving body. Yet the fact that arts education is primarily geared towards the genesis of learning, that is, the innate proclivity for children to learn through movement and play, renders arts education the perfect vehicle to induce change in education via embodied learning.

[17] Listen to my Podcast via this link: https://itunes.apple.com/nl/podcast/move-to-the-music/id1327914571?i=1000397895671&mt=2

General Conclusions

General Conclusions

Despite compelling evidence on the essential role of the body in learning processes, the body has been largely ignored and subjugated to the mind in many educational settings (Armour, 2006 ; Chodakowski & Egan, 2008; Powell, 2007; Reid, 1996; Evans & Davies; 1996). Ample evidence in various empirical studies demonstrates that active deployment of the body significantly enhances the acquisition of knowledge and skills (Alibali & Nathan, 2012; Cook et al., 2008; Yang & Damasio, 2007; Glenberg, 2004; 2008). In this study, embodied learning is considered a result from the dynamic interplay between neural processes and bodily action to acquire knowledge and skills (Bowman, 2004; Clark, 2008; Leman, 2008; Thompson 2007; Shapiro 2010, 2014; Wheeler, 2005).

The dissertation focussed on the role of the body in musical learning processes. For understanding the pivotal role of bodily movement for musical skills acquisition, I scrutinized the music transmission and learning process of young musicians in band formations in Nepal and The Netherlands. With this study, I drew generic patterns of bodily communication within musical learning sequences in order to contribute to the understanding and implementation of embodied learning in formal music education. My research revolved around three different sets of research questions, all tied around musical learning processes and embodiment.

Blended modes of music learning – chapter 2

In the first study, I explored how young Nepali musicians, immersed in their traditional local music system, acquired jazz, pop, and rock music through intermusical learning strategies in which bodily communication played an essential role. Despite cultural constraints, these unfamiliar musics were acquired through exchange and transformation of music traditions and performance practices into hybrid musical practices with blended learning strategies. I presented two core findings.

First, I argued that globalization and hybridization processes in which musical practices cross-fertilize, fuse, and exchange material (Frith, 2000; Russell, 2006; Strokes, 2004) do not automatically result in the acquisition of hybridized and unfamiliar musics. Nepali musicians faced cultural constraints and musical challenges due to the lack of accessible music education.

As my second finding, I advanced a theoretical refinement of unfamiliar music acquisition through the process of intermusicality, that is, the flexible negotiation of musicalities between various musical learning settings with multifaceted learning strategies (O'Flynn, 2005). Intermusicality exceeds mere transfer of learning strategies from one music to another. Beyond this transfer, young musicians actively shape new learning strategies. To make this theoretical

proposition more concrete, I developed a model illustrating how young Nepali musicians acquired unfamiliar musics through three degrees of intermusicality. First, young musicians with little to basic theoretical knowledge in unfamiliar musics deployed an intuitive transfer of Nepali musical traits and learning strategies into unfamiliar musics. Their learning process is mainly based on oral transmission of musical skills, and acquired through observation and imitation of other moving bodies in the capacity of teachers, peers, and video tutorials on the Internet. At the second degree, young musicians actively blend local learning strategies for the acquisition of unfamiliar musics through auditory learning, observation, and imitation. At the third degree of intermusicality, the musicians move from general understanding of unfamiliar musics to a full understanding of musical traits and style-specific sound analysis. This enables them to copy these sounds, reflect on their musical decisions, and acquire unfamiliar musics by shaping new learning strategies based on local and novel learning strategies. As can be inferred from the three degrees of intermusicality, the transfer of local learning strategies brings about musical skills to be applied in a new framework by using observation and imitation of bodily movements. This brief outline of the process of musical knowledge and skills acquisition for Nepali young musicians indicates that musical learning is primarily based on and geared from bodily learning processes.

Learning with the body – chapter 3

In furtherance of the finding that bodily communication formed the mainstay of musical learning, I advanced in chapter 3 *how* the body played a role in the acquisition of musical knowledge and skills. I investigated how young Nepali musicians deployed the body in musical learning processes by studying the relationship between bodily communication and the acquisition of musical knowledge and skills. To understand the importance of the body in musical learning, I turned to various scholars who advocate for the return of the body in education (Bowman & Powell, 2007; Duncum & Springgay, 2007; Green, 2007; Osmond, 2007; Powell, 2007; Yang & Damasio, 2007). Although support for the essential role of the body in learning is on the rise, the persistent ontology of bodily subordination to the mind and, equally noteworthy, the implicit divide between the corporeal and the cognitive has been deeply rooted in education (Bowman, 2004). To approximate and facilitate a learning process in which body and mind are united, I drew from theories in neuroscience demonstrating that the body does not operate as one single entity, connected with wires to the brain, but rather consists of numerous compartments each wired with their own unique nerve pathways and chemical channels (Damasio, 2000; Damasio & Damasio, 2006). Consequently, the

body is in the mind. Everything we know is insperable from what we do with our bodies (Bowman, 2004).

In support of the foregoing, I challenged the pervasive body-mind dualism and postulated two findings with important implications for music education. During the first phase of the learning process, students mainly observe particular gestures and bodily movements contingent on an imagined execution of the musical demonstration. Through human-action observation (Calvo-Merino et al., 2005) the students imagine the observed gestures and movements and feel the musical phrase or rhythm in their muscles (Cox, 2011). I found a strong relationship between the use of pantomimic gestures and the understanding of form and syncopated rhythms. In case of melodic acquisition, gestures alone do not suffice. Whilst deploying non-depictive gestures, teachers accompany the speed markers with singing the melody. In sum, during the first phase of learning, students mainly observe gestures and deploy auditory monitoring in preperation of playing.

During the second phase, students move from human action observation to consciouss and (un)coordinated involvement of the body in the learning process. Pervasive throughout the analysis was the observation that unconscious and uncoordinated deployment of gestures or bodily movements, such as uncoordinated beat tapping, indicates difficulty with acquiring a musical skills. My analysis showed a strong relation between consciouss deployment of gestures and bodily movements on the one hand and succesfull acquisition of musical skills on the other. Consciouss allignment of the body with the dominant beat appeared to be essential to musical skill mastery.

The foregoing phases of learning indicate that musical knowledge and skill acquisition arise out of bodily interaction between musicians. Understanding which gestures or conscious bodily movements contribute to the mastery of specific musical parameters provides insight in the way young Nepali musicians make sense of their musical world with embodied learning tools. In sum, this chapter suggested that acquisition occurs when gestures are immitated, when the body consciously synchronizes with musical parameters, and when the body synchonizes with other bodies.

Intersensory learning – chapter 4

Since music making is an embodied activity, expressing deliberate and spontaneous musical information, aiming at collective understanding (Leman, 2008), it stands to reason that students in the Netherlands embark on a similar embodied journey to acquire musical skills. Rather than comparing Nepal and the Netherlands, chapter 4 sought to be complementary to chapter 3, by demonstrating the embodied nature of learning in a Dutch context. Drawing from two strands of anthropological disciplines, anthropology of the senses (Howes & Classen, 1991) and sensory

anthropology (Pink, 2009; Ingold, 2000), I sought to contribute to sensory refinement of embodied musical learning theories. Premised on the assumption that humans place the senses in a hierarchical order or merge the senses depending on the task at hand, referred to as intersensoriality (Howes, 2005; 2006; 2010), chapter 4 aimed at mapping interaction sequences and sequences of sensory learning. Studying sequences of sensory learning and merging or prioritizing of the senses gave access to how young musicians make sense of their musical world.

In order to understand sequences of sensory learning, I placed the learning process in a larger context of body-mind-environment, coined as emplacement by Howes (2005) and Pink (2011). The salutary shift from a dual relationship between body and mind towards a moving body within an environment, provided insight in the ways the body learns through movement and by sensing the world in constant interaction with other learners. I conducted my analysis with two analytical tools: 1) interaction analysis: studying the outcome of sensory learning and musical interaction forms in relation to musical skill analysis; 2) place-event analysis: studying objects, human socialities, and the nexus of events (ways of practicing and preparation for a rehearsal). More concretely, aside from focusing on bodily interactions between students, leading towards acquisition of musical skills, I mapped out the ecology of learning as captured in rich descriptions about their musical background, their learning space, and their learning activities preceding the weekly band rehearsals.

With the interaction analysis, I discovered that the body and the senses, once deliberately deployed, constitute musical learning as a sequential process. The role of the teacher or peer, conveying musical information via bodily communication sequences, is indispensable. These embodied messages enable the perceiver to approximate the right bodily movements through active imitation. Once surfaced into our awareness, active bodily involvement, that is, deliberate employment of the body in terms of synchronization with the music and other players, proved to be the tipping point at which the learner masters musical knowledge and skills. I did not aim for detecting moments of acquisition as isolated events, but rather focused on the whole embodied process preceding this moment.

The following findings give a more fine-grained analysis on when students merged or prioritized the senses as illustrated in the sequences of learning in chapter 4. Captured within bodily communication, sensory activities such as visual, auditory, and kinaesthetic learning were deployed as learning tools. During the learning process, the senses were often merged and alternately prioritized depending on the task. Three pervasive prioritization and merging modes emerged from the analysis. First, a blend of visual and auditory focus consistently recurred in the analysis. The students prioritized the observation of bodily movements that served as illustrators of what they heard. Upon building this blend of auditory and visual information, the students actively involved their body in the learning process through imitation of the previously observed bodily movements. In

the second mode, students deployed self-regulatory learning tools to locate mistakes through auditory information. The prioritization of auditory input to detect mistakes was followed by a confluence of auditory and visual merging on corrective bodily information from peers or teachers. Third, the senders of corrective musical information merge auditory with kinaesthetic information and actively linked the music with illustrative bodily movements in synchrony with various musical parameters such as melody, tempo, rhythm or chords/harmony. Subsequently, the recipient of this corrective information observes the movements, imitates them, and moves from imagination of the performance to active and deliberate bodily involvement.

How did intersensory learning give access to musical skills? A confluence of visual and auditory learning was deployed to prepare for cohesion and chords, followed by active imitation of observed bodily information. Bearing on auditory information, students later included visual focus on other bodies and processed melodic and rhythmic information through gestures and movement before active kinaesthetic involvement. When it comes to tempo, students prioritized active kinaesthetic involvement as an embodied experience in an immediate response to visual and auditory information of the dominant beat. Chapter 3 showed that observation of gestural information and deliberate rhythmic preparation followed by active bodily synchronization constitutes musical learning. Building on this finding, chapter 4 indicated that, depending on the task, students merge auditory and visual sensory activities, followed by privileging active kinaesthetic involvement. Ubiquitous within the learning process throughout both chapters is the conscious preparation through observation preceding deliberate synchronization of the body with the dominant beat.

Throughout chapter 4, I contextualized the ecology of learning and linked the outcomes of the interaction analysis to the place-event analysis and found three interesting relations between the musical background and the role of the teacher on the one hand and the acquisition of musical skills on the other hand. First, less advanced students generally seek for more confirmation than advanced players. They rely on observed kinaesthetic information before exhibiting the acquired musical information with kinaesthetic involvement. Second, there are significant relationships between imitation and the acquisition of rhythm and kinaesthetic involvement and the acquisition of cohesion for bands with strong leadership. This indicates that corrective teacher or peer interference in the form of gestural and kinaesthetic information is contributive to musical skill acquisition. Third, for advanced players there is a strong relationship between imitation and tempo acquisition. The inculcation of instrument mastery is held to be conducive to increased collective learning. Instrument mastery determines the room for visual focus on other moving bodies and has a positive impact on tempo acquisition. Less advanced players, however, mainly focus on their own instrument, which obstructs the acquisition of tempo. This finding suggests that active synchronization with other

moving bodies is essential to musical learning. It demonstrates the importance of multisensory learning with an emphasis on kinaesthetic involvement, especially for less advanced students.

Implementation – chapter 5

Chapter 5 aimed at providing arguments for the implementation of embodied learning in education by moving away from the pervasive paradigm of rational cognitive thought. Embodied learning offers a more comprehensive learning experience in which learning is considered a continuous interplay between body and mind. Based on a towering body of evidence in support of the importance of awareness of the essential role of the body in learning and teaching (Bremmer, 2015; Bowman, 2004; Bowman & Powell; Yang & Damasio, 2007; Fenwick, 2006; Michelson, 1998), I interviewed experts in the field of music education, research, and policy, and presented possible research implications drawn from my study for music education in general. Premised on the assumption that the emphasis on learning as a purely cognitive endeavour renders the body elusive, I addressed how language and text domination in a constraining physical space can be harmful to a learning and exploratory body.

A critical stance towards the veneration of cognitive learning reinforces two important arguments for the implementation of embodied learning in music education. First, embodied learning is inclusive of all children's proclivity towards non-discursive modes of learning, regardless of their cognitive capabilities. Second, music and movements are closely connected. Embodied learning, with the emphasis on learning through movement, caters to the propensity of learners to entrain their bodies with the beat.

Linking the data of the interviews back with my findings in the first three empirical chapters, I found that successful implementation of embodied learning hinges on the awareness of teachers of the pivotal role of conscious synchronization and intersensory learning. Ample evidence in this research points at the importance of aligning the body with the dominant beat and synchronization with other bodies. Supporting the students through clear demonstration of musical parameters followed by imitation is imperative to conscious synchronization. Remedy to unconscious synchronization is knowledge on when and how sensory activities are conducive to acquiring a certain musical skill. In addition to my findings on the prioritization of specific sensory activities in chapter 4, my respondents proposed a confluence of auditory learning, visual learning, and a physically experienced beat (corrective beat markers on the body) to correct for a-synchronous movements.

My analysis posits two didactical core principles for embodied learning in music education. The first key ingredient to gradually adapt from cognition-based learning to embodied learning is the

establishment of a safe space to learn. Prudence is called for when introducing collective embodied activities, as students often harbor bodily inhibitions around musical learning. One-on-one embodied learning between student and teacher could mitigate the unfamiliarity with embodied didactics. Second, teachers should become sensitized to habitually correct for a-synchonicity through training. This enables teachers to detect a-synchronous alignment of the body. Equipped with sufficient didactical tools, teachers can tackle this learning error through maximized use of the body and minimized use of language.

Implementing embodied didactics is a change that will bring with it, among other things, connections between acquired knowledge. Rather than absorbing knowledge in separate chunks, students would benefit from carefully connected topics that are explored from different angles in various embodied ways. Horizontal teaching could help students make sense of novel skills and knowledge in a broader context. This connection, however, is strongly dependent on the level of rigorous change that teachers are willing to make. Only if all teachers in various courses implement embodied didactics, the effects on knowledge and skill acquisition could be reaching further than mere experimentation with some elements of embodied learning by a single teacher. From this premise, my conclusion is that teachers need to co-create their education in cooperation with their students. Educational changes can only be successful if the stakeholder experience ownership. From ownership, learning easily emerges.

According to the Ministry of Education, Culture, and Science of the Netherlands, educational change can be hindered by two constraining elements. First, teachers often experience pressure to meet measurable learning outcomes. Consequently, teachers remain transfixed in familiar transmission modes rather than experiencing room for exploration of novel teaching modes. Second, due to the lack of organized networks in arts education, progressive methods do not trickle down to a broader audience of teachers. To combat the latter constraining factor in particular, I aim at disseminating the results of this study in arts education learning communities. Potentially, these communities can serve as a vehicle to consolidate educational competencies. In co-creation with teachers and students, I strive at finding possible ways for successful implementation of embodied learning in arts education.

Reflection

My research has been an exploratory journey through the academic fields of education, embodied cognition, musicology, anthropology, and sociology. I consider the interdisciplinary approach of this study beneficial to gaining a better understanding of embodied learning. More specifically, the blend of qualitative and quantitative research methods allowed me to offset the weaknesses inherent to the use of a single method. For example, the methodological choices in chapters 3 and 4 gave me access to relations between musical interaction and the acquisition of musical skills. The quantitative data served as a starting point from which I extrapolated meaningful relations between certain sensory interactions and the acquisition of skills. As such, the quantitative results directed my focus to certain elements in the qualitative transcriptions that warranted closer attention and informed me about relationships between specific features that were particularly difficult to identify with qualitative methods. Subsequently, I analysed significant relationships between these features by deploying qualitative methods based on the rich observational data and the interviews. In other words, the numbers where the starting point, but the observations served as the explanation and contextualization of learning.

Due to the largely unexplored methodological approach of mixed methods in musicology and the field of music education, I faced some challenges in regard to choosing the appropriate analysis to understand the underlying structure of musical skill acquisition. Instead of conducting a time series analysis, in which the quantitative observations are evenly spread over time, I had to determine with the *lag-function* whether the impact of musical interaction on musical skill acquisition was immediate or likely to take some time to take effect. As a result, each clip varied in length, but the sequence of each clip, starting from the first musical interaction form to the potential acquisition of musical skills, was similar in representing meaningful occurrences.

Some might think that I am gliding over some treacherously thin ice by claiming that conscious synchronization contributes to musical mastery. My finding reflects the paradox of the chicken and the egg. Is conscious synchronization conducive to the acquisition of certain musical parameters, or is conscious synchronization merely a bodily expression of mastering the parameter at hand? I did not use brain scans to determine whether aligning the body with a dominant pulse is conscious or unconscious. Based on the data, however, I am convinced that whenever students deliberately deploy their body to synchronize with the music, they seem to acquire specific musical parameters. Throughout the whole data set a pervasive pattern emerged in which the penny finally dropped after focused observation of bodily movements, followed by conscious imitation of those movements, perfectly aligned with the dominant beat.

With regard to the selection of variables; I merely focused on non-verbal modes of communication such as music related gestures and bodily interaction forms. The bulk of learning occurred non-verbally, as the students fell back on gestures and entrainment as the main sources of musical information to correct either themselves or others. This preference of music in action (Barrett, 2005) was prevalent throughout the data set. Sometimes teachers coupled depictive gestures with strong vocal support to guide the students through a particularly difficult section. Although I mentioned this vocal support in the episode reports, I did not select this verbal interaction form in the variable set. Admittedly, this renders the categories of interaction forms incomplete. Despite preference for non-verbal modes of musical communication, verbal modes of communication did play a role in the learning process, albeit a marginal one. In particular, the combination of non-depictive gestures and pantomimic gestures on the one hand and vocal support in the form of singing or counting deserves further scrutiny.

Reflecting on my observational method choices, I acknowledge that my presence as a recognized outsider influenced the behaviour of the band members. Before the observations, I briefly explained the aim of my study in laymen terms. Thereafter, I took the role as an observer without participating in or interfering with the learning process. Despite my best efforts to remain unobtrusive during the band rehearsals

the students performed their repertoire instead of naturally studying the musical material. For example, the students in Kathmandu organized a two hour concert with food and drinks as a warm welcome. Correspondingly, in Amsterdam, there was a tendency to only practice already mastered material in the first weeks of my research. As a response, I explained that I wasn't particularly interested in their skill mastery. Moreover, I was interested in the learning process in general. As expected, the novelty of my presence faded and after two weeks the students did no longer edit their activities or behaviour. I turned into a part of the comfy couch in the rehearsal space. From that moment onwards, I became a fly on the wall.

As I sought to situate my research within the existing academic trajectory, I used text and videos to convey my findings. While it is highly informative to read about the sensory experiences of the music students and to see their bodily attempts to acquire music skills via the QR-codes, other sensory experiences remained untouched and unfelt. In retrospect, I could have explored the possibilities of sensory ethnographic representation (Pink, 2015). Rather than representing my findings in texts or images, I could have considered multisensory ways to convince my audience. This has two important implications: 1) By seeking new sensory ways to communicate about embodied learning, the reader could experience the learning process of the music students in an embodied way. In line with the advanced argument that cognitive processes are grounded in action, the reader benefits from an embodied experience, rather than just reading a text and watching the videos. An

immersive experience, including text, sound, and bodily involvement might propel the reader to a new level of musical understanding. 2) Through what Pink (2015) coins as “empathetic engagements” the audience is not only involved in embodied knowing of musical learning, but at the same time it invokes a sense of understanding what it is like to be the participant of this study.

By the same token, my research methodology in which I observed learning processes as a fly on the wall, could have benefitted from a sensory ethnographic approach. I could have immersed myself in the learning process by participating and experiencing the bodily learning process rather than prioritizing my observant eyes and ears over the moving body. Empathetic engagement contributes to ethnographic experiencing in the broadest sensory sense and offers new routes to understand the experiences of our research participants through the lens of our own felt experiences. By no means I tend to emulate scholarly practices of writing or replace this conventional practice with other sensory modalities of communication. Yet we should explore alternative methods to study embodied practices and find new ways to convey the outcomes of embodied research. I fully agree with Pink when she argues: "Scholarly writing remains a central, and I believe crucial, medium for the description, evocation, argument and theoretical debating of ethnographic research that attends to the senses. Yet conventional scholarly practice is limited in its capacity to communicate about the directness of the sensory and affective elements of emplaced experience" (pink, 2015: 3). Enticed by the new possibilities of the largely unexplored field of sensory ethnography, my future embodied research projects should start with a critical reflection on the level of sensory modalities employed. Does my methodological approach capture learning on all sensory learning levels or do I need to explore alternative ethnographic routes of embodied knowing?

This PhD-trajectory was just a start of a longer academic journey towards many more innovative embodied education projects. In the meanwhile, my advice to teachers and music students: Let your body move to the music. Let your body go with the flow!

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Appendix 1: list of clips

Chapter 2

Video 1: Observation of older members
https://www.youtube.com/watch?v=MRyPlHRF3CI

Video 2: Theoretical knowledge
https://www.youtube.com/watch?v=KFuybLJ_zlU

Video 3: Rohit John Chettri : Bistarai
https://www.youtube.com/watch?v=UyKyqjnxy-4

Video 4: Reflection
https://www.youtube.com/watch?v=pI52kqfcC4k

Video 5: Joint Family International – Neta Ji
https://www.youtube.com/watch?v=G_ltraaL5QM

Video 6: form
https://www.youtube.com/watch?v=7U53YLZ_U3c&list=PLJ1qhH6Pmhe2rmyKx9H9FHSXmi_bmg2Yi&index=6

Chapter 3

Video 1: Non-depictive
https://www.youtube.com/watch?v=1S08vKySMSk

Video 2: Observation of gestures
https://www.youtube.com/watch?v=EJ7LSTYMeoM&list=PLJ1qhH6Pmhe2rmyKx9H9FHSXmi_bmg2Yi&index=1

Video 3: Embodiment
https://www.youtube.com/watch?v=6Aw0oSwF6kg&list=PLJ1qhH6Pmhe2rmyKx9H9FHSXmi_bmg2Yi&index=3

Video 4: Cohesion
https://www.youtube.com/watch?v=rmUDcvIUrLE&feature=youtu.be

Video 5: Confirmation
https://www.youtube.com/watch?v=x4iqNQlIoIo&list=PLJ1qhH6Pmhe2rmyKx9H9FHSXmi_bmg2Yi&index=5

Video 6: form
https://www.youtube.com/watch?v=7U53YLZ_U3c&list=PLJ1qhH6Pmhe2rmyKx9H9FHSXmi_bmg2Yi&index=6

Video 7: Pantomimic
https://www.youtube.com/watch?v=_DWVWVRi7Pc&list=PLJ1qhH6Pmhe2rmyKx9H9FHSXmi_bmg2Yi&index=7

Video 8: Melody
https://www.youtube.com/watch?v=w9SSm0IR-UY&list=PLJ1qhH6Pmhe2rmyKx9H9FHSXmi_bmg2Yi&index=8

Video 9: Jazz melody
https://www.youtube.com/watch?v=inx9tCq1B8E&list=PLJ1qhH6Pmhe2rmyKx9H9FHSXmi_bmg2Yi&index=9

Video 10: Depictive gesture
https://www.youtube.com/watch?v=ytBpy6WekJs&index=10&list=PLJ1qhH6Pmhe2rmyKx9H9FHSXmi_bmg2Yi

Video 11: Depictive gestures
https://www.youtube.com/watch?v=9tuOQujtwfg&index=11&list=PLJ1qhH6Pmhe2rmyKx9H9FHSXmi_bmg2Yi

Video 12: Fusion performance
https://www.youtube.com/watch?v=OG_HwgMLULc&index=12&list=PLJ1qhH6Pmhe2rmyKx9H9FHSXmi_bmg2Yi

Video 13: Chords and harmony
https://www.youtube.com/watch?v=kVw0vhoz6GY&index=13&list=PLJ1qhH6Pmhe2rmyKx9H9FHSXmi_bmg2Yi

Chapter 4

Video 1: Confirmation Sequence
https://www.youtube.com/watch?v=yvVKaFE-vQI&list=PLJ1qhH6Pmhe2-2H7XKp4Yv7MvaE540bbz

Video 2: Correction Sequence
https://www.youtube.com/watch?v=BOzJsVjkMn4&feature=youtu.be

Video 3: Confirmation Sequence
https://www.youtube.com/watch?v=-mc6x-218J8&feature=youtu.be

Video 4: Correction Sequence
https://www.youtube.com/watch?v=XYtW1HmbjMU&feature=youtu.be

Video 5: Visual & Auditory Focus
https://www.youtube.com/watch?v=CeaNNUEkGiU&feature=youtu.be

Video 6: Acquisition of Rhythm (auditory focus)
https://www.youtube.com/watch?v=ASfklTP4RM8&list=PLJ1qhH6Pmhe2-2H7XKp4Yv7MvaE540bbz&index=5

Video 7:Confirmation Sequence
https://www.youtube.com/watch?v=2EH_3YUk2wM&feature=youtu.be

Video 8: Correction Sequence
https://www.youtube.com/watch?v=J4ewfOYqLNk&feature=youtu.be

Video 9: Self-Correction Sequence
https://www.youtube.com/watch?v=lF1t0uDkQHc&feature=youtu.be

Video 10:Correction Sequence
https://www.youtube.com/watch?v=gugVzHxOCZ0

Video 11:Correction Sequence
https://www.youtube.com/watch?v=J6eONE-kH0c&feature=youtu.be

Video 12: Acquisition of Melody
https://www.youtube.com/watch?v=-ugiMLN5Tvw&feature=youtu.be

Video 13: Individual Tempo Acquisition
https://www.youtube.com/watch?v=W0pzfykYOwo&feature=youtu.be

Video 14: Collective Acquisition of Tempo
https://www.youtube.com/watch?v=fcHcKTJk_Bw&feature=youtu.be

Appendix 2: Coding scheme

Keyword Summary Report chapter 3

Entrainment

conscious synchronization

stable phase relationship
adjustment by musicians to synchronize with other musicians' patterns

temporal hierarchy
relationship between the various rhythms

unconscious synchronization
unconscious identification and synchronization of periodicities in sound environment

Gestures

deictic
pointing gestures to non-physical and physical aspects of musicking

depictive
analogous movements to rhythm. illustrators of melodic flow and rhythmic patterns.

emblematic
cultural specific hand movements (thumbs up)

iconic
depict the manner in which a certain action should be executed (demonstration)

non-depictive
mark the musical process of a piece (speed markers)

pantomimic
simulation of action

Interaction

confirmation
confirming musical actions

Correcting
evaluation and correction of musical actions

imitation
imitating bodily movements

monitoring
observing other musicians movements

Outcome variables

Acquisition of chords/harmony 

Acquisition of cohesion
Musicians are able to play clear endings and beginnings.

Musicians are able to play in a similar groove.

Acquisition of form 

Acquisition of melodic patterns 

Acquisition of music theory 
Understanding theoretical concepts

Acquisition of Rhythmic Patterns

Keyword Summary Report chapter 4

Musical interaction

Confirmation
Confirming well played phrases, smooth transitions or gestures to express contentment

Correcting
evaluation and correcting of musical actions

Imitation
imitating bodily movements, melodic phrases and rhythmic patterns

Monitoring
observing other musicians' movements

Sensory model

Auditory 
Auditory learning encompasses listening to recordings or music examples played by peers or teachers

Kinaesthetic 
kinaesthetic-tactile learning, realization through movement

visual 
ocular focus (using the eyes for observation)

Outcome variables

Acquisition of chords/harmony

Acquisition of cohesion

Acquisition of form

Acquisition of melodic patterns

Acquisition of rhythmic patterns

Acquisition of tempo

Appendix 3: example episode reports

Clip: Rehearsal 1 part 1 Quick Clip 9

Collection: Quick Clips
File: C:\Users\jaco\Videos\DSOPM period 2\Rehearsal 1\MOV005-Analysis.mp4
Time: 0:11:20.2 - 0:11:40.2 (**Length:** 0:00:20.0)
Series: DSOPM 2
Episode: Rehearsal 1 part 1
Episode Transcript: Rehearsal 1 part 1
Clip Transcript:

keys gives the first note for the voicing, singer 1 moves with her head and starts singing- singer 2 observes her and moves with his hand on the beat. No clear start. Band starts countdown- no visual communication. Singer 2 taps with his hand on his body for the beat

Clip Keywords:

Musical interaction : Confirmation
Musical interaction : Correcting
sensory model : Auditory
sensory model : kinaesthetic

Clip: MOV025-Analysis Quick Clip 2

Collection: Quick Clips
File: C:\Users\jaco\Videos\fieldwork Nepal July 2012\KJC Rock combo 1-8\MOV025-Analysis.mp4
Time: 0:00:42.4 - 0:01:00.9 (**Length:** 0:00:18.5)
Series: KJC Rock combo
Episode: MOV025-Analysis
Episode Transcript: KJC Rock combo rehearsal 4
Clip Transcript:

Bass accent on syncopated notes with foot-strong emphasis on sustained note (with whole body), slightly to early-focusing on guitar, head bended towards drums-on sustained note immediate entrainment- singer moves his whole body on chorus-verse very accurate short taps in contrast with the 8th note melody-1 bar too early with jump-teacher moves hand to show where to start 'jump'

Clip Keywords:

entrainment : conscious synchronization
entrainment : unconscious synchronization
Gestures : depictive

Appendix 4: Interview schedule

Chapter 2

Name	Instrument	Music School	Country
Kismat Shrestha	Drums	KJC	Kathmandu, Nepal
Abhisek Bhadra	Piano	KJC	Kathmandu, Nepal
Subash Siwa	Guitar	NMC	Kathmandu, Nepal
Mahesh Tundukar	Guitar	KJC	Kathmandu, Nepal
Nihesh Rai	Guitar	NMC	Kathmandu, Nepal
Rakesh Rai	Guitar	NMC	Kathmandu, Nepal
Rishav Acharya	Drums	KJC	Kathmandu, Nepal
Sabin Munikar	Violin	KJC	Kathmandu, Nepal
Suyok Sotang	Vocals, Guitar	KJC	Kathmandu, Nepal
Yuvash Vaida	Piano	KJC	Kathmandu, Nepal

Chapter 4

Name	Interview	Music school	Country
Moxi Delight	Focus group interview	Mo-Music Activation	Amsterdam, the Netherlands
DSOPM 1	Focus group interview	Dutch School of Popular Music	Amsterdam, the Netherlands
DSOPM 2	Focus group interview	Dutch School of Popular Music	Amsterdam, the Netherlands

Chapter 5

Name	Occupation	Institute	Country
Ton Hordijk	Music teacher	Ring van Putten	Spijkenisse, the Netherlands
Roosje Blenckers	Head education	Aslan music school	Amsterdam, the Netherlands
Leo Molendijk	Head music education department	Codarts	Rotterdam, the Netherlands
Abhisek Bhadra	Musician	Codarts	Rotterdam, the Netherlands
Meia Wippoo	Supervisor creative learning lab	De Waag Society	Amsterdam, the Netherlands
Siela Jethoe	Policy advisor Lecturer	Ministry of Education, Culture, and Science	The Hague, the Netherlands
Wim Burggraaff	Policy advisor Lecturer	Ministry of Education, Culture, and Science	The Hague, the Netherlands

English summary

Despite compelling evidence on the essential role of the body in learning processes, the body has been largely ignored and subjugated to the mind in many educational settings (Armour, 2006 ; Chodakowski & Egan, 2008; Powell, 2007; Reid, 1996; Evans & Davies; 1996). Ample evidence in various empirical studies demonstrates that active deployment of the body significantly enhances the acquisition of knowledge and skills (Alibali & Nathan, 2012; Cook et al., 2008; Yang & Damasio, 2007; Glenberg, 2004; 2008). In this study, embodied learning is considered a result from the dynamics between the body and the brain. This process could be roughly explained as the dynamic interplay between neural processes and bodily action to acquire knowledge and skills (Bowman, 2004; Clark, 2008; Leman, 2008; Thompson 2007; Shapiro 2010, 2014; Wheeler, 2005).

This dissertation focusses on the role of the body in musical learning processes. For understanding the pivotal role of bodily movement for musical skills acquisition, I scrutinize the music transmission and learning process of young musicians in band formations in Nepal and The Netherlands. With this study, I draw generic patterns of bodily communication within musical learning sequences in order to contribute to the understanding and implementation of embodied learning in formal music education. My research is divided in three sets of research questions that pertain to musical learning processes and embodiment.

1) Blended modes of music learning: Shaping intermusicality in Kathmandu

In this dissertation, I examine the acquisition of popular music by young musicians for whom local traditional music holds a prominent place in the musical learning process. Focusing on the particularities of musical learning in Kathmandu, Nepal, this study shows that the acquisition of unfamiliar popular music is subject to cultural constraints and musical challenges. I investigate how young Nepali musicians who grew up with one prominent, traditional local musical system acquire knowledge and musical skills in unfamiliar music later in life through intermusical blended modes of appropriation, that is, the merging of local and unfamiliar musical learning strategies and skills. Through a series of interviews and analysis of music videos, I demonstrate that learning unfamiliar music requires intermusical blended modes of appropriation, in which bodily information of peers played an essential role.

This research presents two core findings. First, the acquisition of hybridized and unfamiliar musics does not come automatically with globalization. Current theories assume that due to transnational flows, musics and musical practices cross-fertilize and fuse into novel hybrid forms

(Frith, 2000; Russell, 2006; Stokes, 2004). On a micro-level, however, the acquisition of unfamiliar musics requires agency and involves endless experimentation and learning by trial and error through video tutorials and support by gatekeepers such as peers, family member, and teachers. Second, young Nepali musicians must overcome both social constraints and various musical challenges before they can actively involve themselves in learning new music styles. More concretely, I posit three degrees of intermusical learning leading towards the acquisition of unfamiliar musics. First, intermusicality means intuitively transferring limited theoretical knowledge from already existing local musical knowledge into a creative incorporation of musical particularities of other styles. Furthermore, intermusical learning entails more than mere copying of novel musical material. It brings about skills and knowledge to be applied into a new framework, using observation, imitation, improvisation, and theory into a blended learning experience. Finally, reflecting on musical traits of various musical styles helps provide a fuller understanding of unfamiliar musics.

2) Learning with the body: investigating the link between musical interaction and the acquisition of musical knowledge and skills

In furtherance of the finding that bodily communication formed the mainstay of musical learning, I advance in chapter three *how* the body plays a role in the acquisition of musical knowledge and skills. I investigate how young Nepali musicians deploy the body in musical learning processes by studying the relationship between bodily communication and the acquisition of musical knowledge and skills. In this chapter, I investigate how bodily learning in the form of interaction, gestures and entrainment results in the acquisition of musical knowledge and skills. The outcomes are based on data collected in Kathmandu, Nepal, from 20 band rehearsals. I analysed 12 video recordings using Transana Professional 2.60 which allowed me to present data in keyword sequence maps. I exported the qualitative data set into SPSS for further quantitative analysis, testing the associations between musical communication (independent variables) and musical knowledge and skills (dependent variables) with a binary logistic regression. There seems to be a link between forms of musical interaction, gestures, entrainment, and the acquisition of musical knowledge and skills, such as rhythmic patterns, cohesion, form, melody, theory, chords and harmony. This research demonstrates how Nepali music students address the modern world with embodied learning strategies. Understanding the link between bodily interaction and musical knowledge and skills is conducive to embodied music education and caters to the embodied learning strategies of students.

With this study, I claim that conscious embodiment of musical information significantly enhances the acquisition of musical knowledge. This finding challenges the pervasive body-mind dualism and offers a paradigm for music education and education in general that would reflect on deeply rooted body-mind learning strategies and transmission of knowledge. This realization has two important implications for music education.

First, during the transmission of musical information, the body of the teacher or peer plays an indispensable role in the learning process. Transmission of musical information through gestures underpins musical learning. In order to acquire rhythm, cohesion, form, melody, music theory, or chords and harmony, the teacher deploys a certain pathway of gestures. Those gestures can, however, also occur simultaneously, and are usually accompanied by audible information. For example, a teacher can clap a steady beat (non-depictive gestures) while accentuating a syncopated rhythm with his shoulders (depictive gestures and conscious synchronization), coupled with singing the melody. Observing the body of the teacher means gazing upon full embodiment of musical information. The teachers' pathway of gestures is pregnant with information, telling the student exactly what and how to play. Subsequently, the students, in order to acquire musical skills, need to observe those gestures attentively. Furthermore, they need to imitate the bodily movements.

That brings me to the second implication. My research suggests that acquisition occurs when gestures are copied, when the body is in synchronization with musical aspects, and when the body is in congruence with other bodies. Learning, thus, should be focused on consciously aligning the body with the music. Teachers should encourage students to become increasingly bodily aware in an early stage of the learning process. During the human action observation phase when gestures are deployed to convey musical information, the students could already deliberately imitate the movements in preparation for the participation phase. By doing so, the students actively connect the musical image with coordinated bodily movements. Consequently, as the cognitive processes are grounded in action, musical skills and knowledge solidify in the learner.

3) Sensory learning and the acquisition of musical knowledge and skills

Drawn from anthropology of the senses (Classen, 1997; Howes, 1991; Hsu, 2008) and sensory anthropology (Pink, 2009; 2011), I theorize the role of the body, and in particular the senses, as tools for musical learning in chapter four. In effect, I first study which forms of musical interaction and sensory tools young musicians in the Netherlands deploy during a learning sequence. Second, I investigate how and when different senses were prioritized and merged into each other within these sequences. The exploring and moving body exchanges information through somatic modes of communication with other bodies (Howes, 2005; Jackson, 1983). To extrapolate on somatic modes of

communication between learners, I borrow Howes' (2005) notion of sensory relations. During interaction between learners, senses merge and are being prioritized depending on the action, apparently following a sequence. Bearing on Howes' merging and multi-directionality of the senses, coined as "intersensoriality" (Howes 2004; 2005), it stands to reason that young musicians merge and prioritize the senses to obtain specific musical skills. Hence, the final part of my analysis is to link intersensory learning to the acquisition of musical skills. The associations between musical communication and sensory activities on the one hand and musical knowledge on the other, are analysed in *Transana* and in SPSS by using a cross tabulation analysis.

In chapter four, I show that students go through 3 types of learning sequences: 1) confirmation sequence; 2) correction sequence; and finally, 3) imitation sequence. Each sequence demonstrates how and when students deploy sensory tools and musical interaction forms during the learning process. During the first sequence, confirmation serves as a form of interaction to contextualize specific musical parameters. By looking at kinaesthetic movements of other band members or peers, students gain essential information on a musical skill. Having processed this information, students deploy auditory focus on the musical material mostly through auditory self-correction, confirming whether they play the right notes. In the final step, students imitate the previously observed kinaesthetic movements and confirm he acquisition of musical skills through bodily synchronization with the beat.

From the analysis in chapter four, a confluence of auditory and visual learning emerges. In general, the band members prioritize the combination of visual and auditory focus in preparation of kinaesthetic imitation. The ubiquitous presence of merging and alternate prioritization of visual and auditory focus is followed by kinaesthetic involvement as a final sequential step before skill acquisition. This coincides especially well with theories on human action observation (Calvo-Merino et al., 2005) and musical imagery (Cox, 2011). These studies mainly discuss the embodied nature of the observation phase. Building upon these findings, I demonstrate the importance of conscious rhythmic preparation and synchronization after the observation phase. Based on my analysis, it stands to reason that conscious and deliberate kinaesthetic synchronization fosters musical learning and the acquisition of musical skills.

Implications for music education and beyond

Deliberate alignment of the body with the music lies at the heart of successful musical skill acquisition. As a result, the outcomes of this study challenge the pervasive cognitive paradigm of learning by offering a comprehensive analysis of the interplay between body-mind-environment in musical learning. The findings of this dissertation shed light on the granularity of bodily and sensory

experiences in relation to musical learning processes. In an attempt to move away from the paradigm of rational cognitive thought in education, embodied learning offers a more comprehensive learning experience in which learning is considered a continuous interplay between cognitive and bodily experiences. The final chapter strives to present research implications of this study in music education. I aim to connect my results from the previous chapters with the actual practice of learning and teaching in formal and informal music education. Both case studies in Nepal and the Netherlands were conducted in music schools in informal settings. Indicative of informal learning is the emphasis on peer to peer learning with limited or no guidance of a teacher. Although my results on embodied learning are drawn from informal music school settings, I strive to translate my outcomes to more formal and teacher-centred settings as well. In many ways, the results of my study on acquisition of musical knowledge and skills through bodily interaction present opportunities for educational change through exploration of the body. Knowing when and how students deploy their body and merge sensory activities bears relevance to music teachers in a formal setting. A pedagogical shift, in which the body plays a central role in learning, might drastically change the curriculum and the way we teach.

The final chapter constitutes recommendations for an embodied curriculum in music education. I will offer arguments for the introduction of embodied learning in the classroom against the backdrop of cognitive-based learning. To make the implementation of embodied learning more concrete, I outline what I propose are the key foundations of embodied learning and link the data of the interviews for this final chapter back to my findings on conscious synchronization and intersensory learning put forward in the previous chapters of this dissertation. Furthermore, I will present principles of teaching that constitute the didactical foundation of embodied leaning. Taking into account the challenging task of rigorous curriculum change, I finally explore possibilities and constraints for curriculum change and present some attainable embodied routes for teachers through network-building and sharing of good practices in arts education in general.

Nederlandse samenvatting

Ondanks overtuigend bewijs dat het lichaam een belangrijke rol speelt in leerprocessen, is de rol van het lichaam in het onderwijs marginaal en onderworpen aan de hersenen (Armour, 2006; Chodakowski & Egan, 2008; Powell, 2007; Reid, 1996; Evans & Davies, 1996). Uitkomsten van empirische onderzoeken laten echter duidelijk zien dat actieve inzet van het lichaam significant bijdraagt aan de beheersing van kennis en vaardigheden (Alibali & Nathan, 2012; Cook et al., 2008; Yang & Damasio, 2007; Glenberg, 2004; 2008). In dit onderzoek beschouw ik lichamelijk leren (*embodied learning*) als een interactief samenspel tussen het lichaam en de hersenen. We kunnen dit samenspel grofweg omschrijven als een dynamische interactie tussen neurale processen en lichamelijke actie tot het verkrijgen van kennis en vaardigheden (Bowman, 2004; Clark, 2008; Leman, 2008; Thompson 2007; Shapiro 2010, 2014; Wheeler, 2005).

In deze dissertatie onderzoek ik de rol van het lichaam in muzikale leerprocessen. Om de essentiële rol van het bewegende lichaam voor de beheersing van muzikale vaardigheden te begrijpen, onderzoek ik het muzikale leerproces van verschillende bands in Nepal en Nederland. Met deze dissertatie streef ik ernaar om generieke patronen te vinden van lichamelijke communicatie binnen muzikale leersequensen om bij te kunnen dragen aan de implementatie van lichamelijk leren in formele muziekeducatie. Dit onderzoek is verdeeld in drie deelonderzoeken in relatie tot muzikale leerprocessen en lichamelijkheid.

1) Gemende vormen van muzikaal leren: de vorming van intermuzikaliteit in Kathmandu

In het eerste deel van mijn onderzoek bestudeer ik het muzikale leerproces van jonge muzikanten in Kathmandu. Deze jongeren zijn opgegroeid met traditionele, lokale muziek en hebben slechts beperkt toegang tot het leren van populaire muziek. Dit onderzoek laat zien dat het beheersen van "onbekende muziek" (*unfamiliar musics*), zoals pop en jazz, onderhevig is aan culturele obstakels en muzikale uitdagingen. Ik onderzoek hoe jongeren die opgegroeid zijn met een dominant lokaal muzieksysteem kennis en vaardigheden in een nieuw muzieksysteem verkrijgen door intermuzikaal leren waarin lichamelijke informatie van *peers* een belangrijke rol speelt. Door middel van interviews en analyses van muziekvideo's, toon ik aan dat de beheersing van onbekende muziek afhankelijk is van intermuzikale vermenging van lokale en nieuwe leerstijlen.

In dit hoofdstuk presenteer ik twee centrale bevindingen. Ten eerste, de beheersing van onbekende muziek is geen automatisch gevolg van globalisering. Voorgaande theorieën over globalisering bevestigen dat door transnationale culturele stromen muziek en muziekpraktijken elkaar beïnvloeden en zich vermengen tot nieuwe vormen (Frith, 2000; Russell, 2006; Stokes, 2004).

Op lokaal niveau echter, blijkt de beheersing van muzikale vaardigheden in onbekende muziek afhankelijk van eindeloos experimenteren en leren met behulp van *video tutorials* en de steun van leeftijdsgenoten, familie en docenten. Ten tweede, jonge muzikanten in Nepal moeten zowel sociale beperkingen overwinnen als muzikale uitdagingen aangaan, voordat ze zich actief kunnen storten op het leren van nieuwe muziekstijlen.

Voor het beheersen van nieuwe muziekstijlen doorlopen de jonge muzikanten drie stadia. In het eerste stadium blijkt intermuzikaal leren voornamelijk te bestaan uit een intuïtieve vermenging van beperkte theoretische kennis en bestaande lokale muzikale kennis met muzikale kenmerken van nieuwe muziek. Het tweede stadium laat zien dat intermuzikaal leren veel meer is dan louter kopiëren van nieuw muzikaal materiaal. De studenten passen de nieuwe muzikale kennis toe en creëren hun eigen klank door middel van observatie, imitatie, improvisatie en theorie door lokale en nieuwe leerstrategieën te vermengen. Ten slotte kunnen studenten in het laatste stadium feilloos reflecteren op de vermenging van lokale en nieuwe muziekstijlen en beheersen de uitvoering ervan.

2) Leren met het lichaam: onderzoek naar de relatie tussen muzikale interactie en de beheersing van muzikale kennis en vaardigheden

Als vervolg op de bevinding dat lichamelijke communicatie het fundament vormt van muzikaal leren, presenteer ik in hoofdstuk 3 de wijze waarop het lichaam een rol speelt in het beheersen van muzikale vaardigheden. Ik analyseer hoe Nepalese jongeren hun lichaam inzetten tijdens muzikale leerprocessen, door de relatie tussen lichamelijk leren in de vorm van muzikale interactie, gebaren en synchronisatie aan de ene kant en de beheersing van muzikale kennis en vaardigheden aan de andere kant te bestuderen. De uitkomsten zijn gebaseerd op verzamelde data van 20 bandrepetities in Kathmandu, Nepal. Daarvan heb ik 12 video-opnames geanalyseerd in *Transana Professional 2.60*. Met deze software presenteer ik de data in overzichtelijke *keyword sequence maps*. Ik exporteerde de kwalitatieve data in SPSS voor verdere kwantitatieve analyse waarmee ik de relaties tussen muzikale communicatie (onafhankelijke variabelen) en muzikale kennis en vaardigheden (afhankelijke variabelen) met een logistische regressie analyse zal aantonen. Ik onderzoek relaties tussen vormen van muzikale interactie, gebaren, synchronisatie en de beheersing van muzikale kennis en vaardigheden zoals ritmische patronen, cohesie, vorm, melodie, theorie, akkoorden en harmonie. Dit onderzoek toont aan dat Nepalese jonge muzikanten zichzelf onbekende muziek aanleren door middel van lichamelijke leerstrategieën. Het begrijpen van de relatie tussen lichamelijke interactie en muzikale kennis en vaardigheden draagt bij aan lichamelijke muziekeducatie en ondersteunt jonge muzikanten in het gebruik van lichamelijke leerstrategieën.

De bewuste inzet van het lichaam draagt significant bij aan de beheersing van muzikale kennis en vaardigden. Dit heeft twee belangrijke implicaties voor muziekonderwijs. Allereerst, tijdens

het muzikale leerproces is het bewegende lichaam van de docent of medestudent van groot belang voor het leerproces. Overdracht van muzikale informatie door middel van gebaren ondersteunt het leerproces. Het leren van muzikale kennis en vaardigheden vindt plaats volgens een generiek patroon van gebaren. Deze gebaren komen soms tegelijk voor en worden regelmatig vergezeld door auditieve informatie. Bijvoorbeeld, een docent klapt een regelmatige tel (*non-depictive gesture*) terwijl hij het syncope ritme accentueert met de schouders (*depictive gestures* en bewuste synchronisatie) en daar bovenop de melodie zingt. Het lichamelijke patroon van gebaren en bewegingen zit boordevol met muzikale informatie die de studenten vertelt wat en wanneer te spelen. Het is daarom van groot belang dat de studenten allereerst gebaren en bewegingen observeren en vervolgens letterlijk imiteren.

Dit brengt me bij de tweede implicatie. Mijn onderzoek suggereert dat de beheersing van muzikale vaardigden plaatsvindt als gebaren worden gekopieerd, wanneer het lichaam synchroon loopt met andere lichamen en wanneer het lichaam synchroniseert met de muziek. Het leren van muziek zou derhalve moeten focussen op een bewuste synchronisatie van het lichaam met de muziek. Het is aan te raden dat docenten hun studenten in een vroeg stadium in het leerproces bewust maken van het gebruik van hun lichaam. Gedurende de eerste observatiefase waarin gebaren worden gebruikt om de muzikale informatie over te dragen, kunnen de studenten bijvoorbeeld worden aangespoord om de gebaren te imiteren ter voorbereiding van de participatiefase. Dit leidt uiteindelijk tot een actieve en gecoördineerde lichamelijke koppeling met de muziek. Zodoende worden cognitieve processen geaard in lichamelijke actie en zullen de muzikale vaardigheden beter beklijven.

3) Zintuiglijk leren en de beheersing van muzikale kennis en vaardigheden

Dit hoofdstuk is schatplichtig aan antropologie van de zintuigen (Classen, 1997; Howes, 1991; Hsu, 2008) en zintuiglijke antropologie (Ede, 2009; Pink, 2009; 2011). Ik theoretiseer de rol van het lichaam, en in het bijzonder de rol van de zintuigen, als gereedschap voor muzikaal leren. In hoofdstuk vier onderzoek ik welke vormen van muzikale interactie studenten gebruiken en welke zintuiglijke processen ze doorlopen tijdens een leersequens. Vervolgens analyseer ik hoe en wanneer studenten voorrang geven aan bepaalde zintuigen en wanneer ze in elkaar overlopen in een leersequens. Het lerende en bewegende lichaam deelt informatie door middel van somatische communicatiemodi met andere lichamen (Howes, 2005; Jackson, 1983).

Ik baseer mijn onderzoek op het begrip van “zintuiglijke relaties” van Howes (2005). Tijdens het interactieproces tussen studenten lopen de zintuigen in elkaar over en worden ze in een leersequens geprioriteerd afhankelijk van de betreffende taak. Uitgaande van de prioritering en

vermenging van zintuigen, door Howes omschreven als “interzintuiglijkheid” (Howes 2004; 2005), is het aannemelijk dat jonge muzikanten ook voorrang geven aan bepaalde zintuigen of zintuigen vermengen om een muzikale vaardigheid onder de knie te krijgen. In het laatste gedeelte van mijn analyse onderzoek ik de relatie tussen interzintuiglijk leren en de beheersing van muzikale kennis en vaardigheden. Ik analyseer de relatie tussen muzikale communicatie en de beheersing van vaardigheden door de data te analyseren in *Transana* en *SPSS* middels een kruistabelanalyse.

Uit de analyse komen drie leersequensen voort: 1) bevestigingssequens; 2) correctiesequens; 3) imitatiesequens. Elke sequens laat zien hoe en wanneer studenten zintuigen en muzikale communicatie inzetten. In de eerste sequens gebruiken studenten bevestiging als een vorm van communicatie om specifieke muzikale paramaters te contextualiseren. Door het kijken naar kinesthetische bewegingen van andere bandleden verkrijgen studenten essentiële informatie over muzikale vaardigheden. Nadat ze deze informatie hebben verwerkt, focussen ze zich auditief op het materiaal door middel van auditieve zelfcorrectie. In de laatste stap van de sequens, imiteren de studenten de reeds geobserveerde kinesthetische bewegingen en bevestigen ze de beheersing van de muzikale vaardigheid door actieve en bewuste synchronisatie van het lichaam met de puls van de muziek.

De analyse van hoofdstuk 4 toont aan dat studenten voorrang geven aan een combinatie van visueel en auditief leren ter voorbereiding van kinesthetische imitatie. Het vermengen en prioriteren van visueel en auditief leren, opgevolgd door kinesthetische imitatie als laatste stap in de leersequens, loopt als een rode draad door de analyse heen. Deze bevinding sluit naadloos aan op theorieën rondom spiegelneuronen (Calvo-Merino et al., 2005) en muzikaal voorstellingsvermogen (Cox, 2011). Gebaseerd op de bevinding dat observatie weldegelijk belichaamd is, benadruk ik het belang van bewuste lichamelijk voorbereiding en ritmische synchronisatie van het lichaam direct na de observatiefase. Ik concludeer dat bewuste en weloverwogen kinesthetische synchronisatie, muzikaal leren en de beheersing van vaardigheden sterk bevordert.

Implicaties voor muziekonderwijs en onderwijs in het algemeen

Bewuste en geplande synchronisatie van het lichaam met de muziek ligt aan de basis van succesvolle beheersing van muzikale vaardigheden. Dientengevolge betwist ik met de uitkomsten van dit onderzoek het dominante cognitieve onderwijsparadigma. Lichamelijk leren biedt een diepere leerervaring waarin leren is gebaseerd op de wisselwerking tussen lichaam-hersenen en omgeving . In het laatste hoofdstuk tracht ik de uitkomsten van mijn onderzoek te vertalen naar praktische implicaties voor het formele muziekonderwijs. De casestudies in Kathmandu en Amsterdam zijn

uitgevoerd in een informele setting. Kenmerkend voor deze setting is de nadruk op peer-leren met zo min mogelijk begeleiding of bemoeienis van de docent. De vertaling van de uitkomsten van mijn onderzoek in de informele setting naar een meer docent gestuurde formele setting, biedt kansen voor onderwijsvernieuwing met nadruk op het lerende lichaam. Het begrijpen van de wijze waarop en wanneer studenten hun lichaam inzetten om te leren is van grote waarde voor muziekdocenten. Een pedagogische verschuiving waarin het lichaam een centrale rol speelt, zou wel eens grote gevolgen kunnen hebben voor de wijze waarop docenten lesgeven en het curriculum vormgeven.

In het laatste hoofdstuk geef ik aanbevelingen voor een lichamelijk curriculum in muziekonderwijs. Ik beargumenteer waarom een lichamelijk curriculum en lichamelijke didactiek kansen biedt voor het muziekonderwijs tegen de achtergrond van cognitief leren. Met een concrete aanpak schets ik de voorwaarden voor lichamelijk onderwijs en link ik de data van de voorgaande hoofdstukken aan de data van de interviews met experts in het (muziek)onderwijs. Vervolgens presenteer ik de didactische principes van lichamelijk leren. Bewust van de uitdagingen die voor ons liggen, bespreek ik mogelijke obstakels die docenten kunnen tegenkomen wanneer zij overgaan tot een rigoureuze curriculumwijziging. Ten slotte doe ik enkele suggesties voor de implementatie van lichamelijk leren door middel van leergemeenschappen en het delen van *good practices* in muziekeducatie.

About the author

Jaco van den Dool (1980) is a lecturer at the Department of Arts and Culture Studies, teaching arts education courses for bachelor and master students. After playing piano from a young age, he auditioned for the Conservatory of Rotterdam in 1998 and obtained a BA in music education 4 years later. He taught general music, private piano lessons and enthusiastically led several big bands and musical productions at high schools in the Netherlands. During his years as a music teacher he developed a deep interest for music of various cultures in the world. This made him decide to move to Nepal where he worked at the Kathmandu Jazz Conservatory as a piano teacher and music education trainer. Coming back from Asia he studied musicology at the University of Amsterdam and received his MA in the summer of 2011. His passion for music education eventually resulted in a master thesis on ways of transmission of music at music institutes in the Netherlands. Currently, he holds a professorship on 'Blended Learning' at Codarts University of the Arts. In this position, he researches the ways in which digital tools can improve artistic learning in the fields of dance, music and circus. In addition, Jaco is the director of School of Performing Arts Kathmandu, founded in 2011. After the destructive earthquake in 2015 this institute mainly focuses on providing music therapy for homeless children and performing arts classes for government schools and orphanages.

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