



EMBODIMENT IN MUSIC EDUCATION¹

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Résumé

Dans cet article, nous donnons un aperçu des recherches théoriques et empiriques qui illustrent comment et pourquoi le corps de l'étudiant et de l'enseignant jouent un rôle fondamental dans les processus d'apprentissage et d'enseignement musical. Nous abordons les concepts d'entraînement, d'alignement et de prédiction, qui ont été développés dans le cadre de la théorie de la cognition musicale incarnée et leur relation avec l'apprentissage de la musique. En outre, nous voyons comment la modélisation physique, les gestes et le toucher sont d'importantes stratégies d'enseignement incarnées. L'article se termine par quelques suggestions sur la manière dont ces concepts et stratégies peuvent être mis en pratique dans l'enseignement musical.

Mots-clés: éducation musicale, théorie de la cognition musicale incarnée, pédagogie incarnée, enseignement instrumental, enseignement musical général

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Abstract

In this article, we give an overview of theoretical and empirical research that exemplifies how and why the body of the student and teacher plays a pivotal role in music learning and teaching processes. We discuss the concepts of entrainment, alignment, and prediction, that have been developed within the theory of embodied music cognition, and their relation to music learning. Furthermore, we discuss how physical modelling, gestures and touch are important embodied teaching strategies. The article concludes with some suggestion as to how these concepts and strategies can be put into the music educational practice.

Keywords: music education, embodied music cognition, embodied pedagogy, instrumental music education, general music education

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Introduction

Over the past decennia, developmental psychologists, and philosophers such as Dewey, Piaget, Vygotsky, Thelen and Gallagher have drawn attention in their work to the importance of the body's role in thinking and learning (Nijs & Bremmer, 2019). Interestingly, in recent years more and more empirical research has been carried out that exemplifies how the body plays a meaningful role in learning and teaching language, mathematics, and other subjects (Goldin-Meadow et al., 2009; Lindgren et al., 2016). For example, engaging in a physical activity prior to a learning task can increase students' concentration during the task itself (Ratey & Hagerman, 2008). Or, students can make specific movements and gestures, helping them to better understand certain subject matter (Paas & Sweller, 2012). Empirical research also shows that the teachers' body plays a role in learning processes: teachers' gestures may communicate additional information (Goldin-Meadow, 2004); hold the students' attention (Hostetter, 2011); or visualize situations and objects outside the classroom (Nathan et al., 2014). In short: the body of both the student and teacher plays an important role in the learning process.

The assumption that our bodies and movements shape our thinking and that knowledge is expressed in and through the body, is the basic idea of the research paradigm "embodied cognition" (Alibali & Nathan, 2007; Gallagher, 2005). Although different schools of thought exist within the embodied cognition paradigm, they share the overarching idea that thinking and learning processes are formed by a complex interplay between body, mind, and the socio-cultural, physical environment (Gallagher, 2017; Shapiro, 2015). Rather than seeing the body and the senses as mere "receivers" of information, this perspective assumes that the body fundamentally contributes to understanding information from the environment.

To understand this idea, it is interesting to consider the research by Wells and Petty (1980). Their work shows how the body shapes thought processes: participants in their study were asked to nod "yes" or shake "no" while listening to a message through headphones. Following this message, the participants rated their attitudes towards the message. The results showed that "yes" noddors agreed with the message more than "no" shakers.

Furthermore, research shows that knowledge is expressed in and through the body: for instance, gestures can express information during a conversation that is complementary to the spoken language (Goldin-Meadow, 2004).

This article takes the theory of embodied *music* cognition (Leman, 2016) as a starting point to consider the role of the students' and teachers' bodies in music education. The promotion of the role of the body in music education is not new: well-known music educators such as Orff and Keetman, Kodály and Dalcroze were proponents of the use of physical activities to foster musical understanding (Campbell, 1986). However, their ideas were not rooted in theories or empirical research (Bowman & Powell, 2007). We believe that gaining additional theoretical insights on how the students' and teacher's body play a role in music learning could lead to a more conscious involvement of the body in music education. Therefore, we give an overview of the research that exemplifies how and why the bodies of both students and teachers play a role in musical learning and teaching processes. We will first discuss the theory of embodied music cognition in more detail, and then focus on the role of the body of both student and teacher in musical learning processes.

1. Embodied music cognition

According to an embodied music cognition perspective, physical involvement with music shapes the way we perceive, experience, understand and learn music (Leman et al., 2018). While interacting with music during listening, improvising, playing, or dancing, we can make a sound-movement-intention association between sound patterns (e.g., rhythmic, or melodic patterns or chord sequence), movement patterns (e.g., the shape, direction, or energy of a movement), and our intentional states (e.g., an emotion). Through this music-movement association people use their body to transform a stream of sound into a meaningful musical experience (Leman, 2016; Nijs & Bremmer, 2019). This bodily involvement with music is also called enactment (Leman et al., 2018, p. 492): "[Enactment] embraces the idea that our corporeal involvement with music is based on acting along with the music, such as during synchronizing footsteps with music, or during the alignment of arm and hand movements along with the musical expressive flow." Empirical research has found that different bodily mechanisms facilitate this process of enactment (Leman, 2016), namely entrainment, alignment, and prediction. Although we are born with these basic mechanisms, music education can help us to further develop them (Bremmer & Nijs, 2022). We will discuss each of these mechanisms separately.

Entrainment: When two or more people walk together, sooner or later their footsteps will unconsciously syn-

chronize (Yun et al., 2012). Such a process of being pulled towards synchronization is called entrainment (Clayton et al., 2004). People also entrain with music: listening to music, they are pulled towards the beat, which causes them to (unconsciously) seek, find, hold, and ‘become’ the beat (Leman, 2016). For example, people often unconsciously start tapping their foot in sync with the beat while listening or performing music. In choirs, bands and orchestras musicians also synchronize their rhythmic movements, enabling them to play in time together (Clayton et al., 2019; Van den Dool, 2018). This is called “interpersonal” entrainment.

Alignment: Once people have established a timing framework, they will often start aligning their physical movements to specific elements in the music, thereby visualizing music with their body (Eerola et al., 2006). Leman (2016) distinguishes between two types of alignment: phase- and interphase alignment. Phase alignment happens when people match their movements to the rhythmical structures in the music by, for example, clapping their hands to the beat. Inter-phase alignment happens when people visualize music in-between the beats with their body or gestures, such as showing the melodic contour or dynamics of music. Such bodily movements provide people with an expressive and ‘felt’ understanding of the music. In general, both forms of alignment allow musicians to see how fellow musicians express the music, allowing for a group of musicians to musically attune to each other (Bremmer & Nijs, 2022).

Predicting: Different bodily factors play a role in how we predict music, e.g., the biomechanical constraints of our body (such as the length and form such as the length and form into legs, Dahl & Huron, 2007), our arousal state (feeling fatigued or being energetic; Leman, 2016, p. 256), and how we entrain and align with music. For example, music that can be understood as having a duple or triple meter may be confusing and make it difficult to predict the beat. However, by making a movement to the beat, such as three steps forward and back again, the confusion of the duple and triple perception can be solved as our body helps us to predict the music as a triple meter (see also Naveda & Leman, 2009). In this way, bodily movement can help to understand music by focusing the attention on a certain feature in the music, which makes it easier to predict (Frischen et al., 2022).

In summary, according to an embodied music cognition perspective, the body plays a pivotal role in experiencing, learning, and understanding music. In music education, students and teachers exchange musical information through their bodily movements, physical posture, mimicry,

and gestures, and attune to each other through their bodies. In the following paragraphs, we will give an overview how and why the bodies of both students and teachers play a role in musical learning, based on empirical and theoretical research.

2. The role of the student’s body in music learning

2.1. The student’s body in classroom music education

Children have a natural inclination to move to music (Eerola et al., 2006; Gluschkof, 2018; Juntunen, 2020; Nijs & Bremmer, 2019). In view of promoting musical understanding and expressiveness, this pleads for the use of physical activities to offer children rich musical experiences. The value of movement for learning music has already been recognized and applied in different music pedagogical approaches. For example, Dalcroze developed a movement-based method to foster musical expression and creativity. In his method, he uses joint movement to music (entrainment), not only to learn to sense the music internally but also to externalize one’s musical understanding (alignment). A typical Dalcroze activity involves walking together around the classroom to music improvised by the teacher, who modifies the tempo and meter of the music. Students might then be invited to adapt their pace to the tempo of the music (entrainment) and perform specific arm movements to the beats according to the meter.

Similarly, Orff and Keetman assumed the intrinsic relationship between music and movement, and used both creative (free, expressive) and directive (structured, planned) movements to music in their method. A typical Orff-based activity might invite students to create a rhythmic composition using body percussion techniques, such as clapping, snapping, and stomping, while synchronizing their movements with the selected music. Furthermore, Kodály used a form of melodic “alignment” based on Curwen’s hand gestures, to support children visually and kinesthetically in sensing musical intervals and melodic motifs (Abril, 2011).

Although these music educators seldom based their work on scientific research, empirical studies increasingly confirm their practical insights. For example, research by O’Dell (1999) shows that musical activities with movement help young children to maintain a steady tempo and thus help to promote entrainment. Other studies show that Dalcroze activities promote the recognition of and response to familiar rhythm patterns in unfamiliar music (Joseph,

1982) and help improving beat competency (Rose, 1995). As such, movement might enhance rhythm prediction as motor experiences help children to identify -and therefore predict - regularities in the music (Frischen et al., 2022).

Youngson and Persellin (2001) show that using hand gestures helps children to sing more in tune. A similar positive effect on singing was found by Kim (2000) and Chen (2007). Martinovic-Trejgut's findings (2010) reveal that movement has a positive effect on the memorization of text, rhythm, and pitch.

In general, empirical research on the role of movement for musical learning is rather scarce, especially concerning the development of musical expressiveness. Yet, in recent decades new research interest has emerged for the relationship between the body, movement, and music in the field of systematic musicology (for an overview, see Lesaffre et al., 2017). For example, recent work by Fortuna and Nijs (2019, 2020, 2022) shows that not only movement has an impact on the way children make sense of music but also that the nature of that impact is linked to the type of movement used. Children perceive more and different elements in the music when movement is used while listening than when they talk about the music they listened to. In addition, such increased differentiated listening is enhanced by the type of physical movement (e.g., fluid versus rhythmic) used to express the music (alignment). These results resonate, for example, with the results of Maes and Leman (2013), who found that children's expressive movement (happy or sad) to music influences how they attribute emotional value to the music.

2.2. The student's body in instrumental education

Instrumental education adopts a rather different focus on the body, due to the importance of establishing a strong relationship between the body and the musical instrument. In the so-called Western European Conservatory tradition (Jorgensen, 2011), emphasis is most often placed on training the body in function of developing the necessary instrumental skills, with particular attention to correct posture and playing gestures (e.g., bowing). To a much lesser degree, the body is addressed in function of interpretation or expression (Schippers & Campbell, 2012). This is remarkable, given the many studies that emphasize the important role of the body in giving meaning to music (see e.g., Lesaffre et al., 2017; Nijs 2017, 2019), or in the expressive communication between musicians and audience (e.g., Moelants et al., 2017).

Despite the dearth of empirical research on the role of the body in instrumental music learning, we believe three practical approaches to the body can be distinguished. A first, *somatic* approach focuses on the development of body awareness to remedy physical complaints during playing and thus optimizes the use of the body. After all, practicing too much or adopting a bad posture while playing the instrument often leads to physical complaints (Brandfonbrener, 2003; Visentin et al., 2008). Methods such as Alexander technique (Klein et al., 2013), Feldenkrais (1972) or the Franklin Method (Franklin, 2012) are therefore increasingly used in instrumental music education. This often happens in separate courses, but pedagogues like Kato Havas (violin), Paul Rolland (violin) or Irene Sharp (cello) integrate these methods into their own teaching. Davidson (2012), and Davidson and Correia (2002) also advocate movement to optimize playing technique. Again, studies empirically investigating such methods in instrumental education are still scarce.

A second, *complementary*, approach goes beyond this technical/mechanical approach and uses movement to develop specific musical skills (e.g., tempo and rhythmical sense; Conway, 2003) and musical understanding (e.g., phrasing; Schnebly-Black & Moore, 2004). Here, movement is integrated in the repertoire played but applied without the instrument. This approach is often inspired by Dalcroze (Juntunen & Westerlund, 2001) or Laban (Laban & Ullman, 1974). Yelin (1990), for example, combines the creative aspects of Dalcroze's Eurhythmics with the Suzuki repertoire. Schnebly-Black and Moore translate the Dalcroze principles into one-on-one instruction in piano teaching. Conway and colleagues (2014) developed activities based on Laban's effort categories (flow, weight, space & time).

A third, *integrative*, approach goes a step further and combines movement activities with playing the instrument. Usually this concerns the use of choreographies (e.g., Offermans, 1992; Wedin, 2015). However, based on research into the musician-instrument relationship, Nijs argues that the integration of movement and performing music can be taken even a step further (Nijs, 2017, 2019; Nijs et al., 2013). According to Nijs (2019), the use of expressive movement *with* the instrument promotes both the subjectification of the body (i.e., using one's own body as a source for independent expression and meaning), and the incorporation of the instrument into the body (i.e., feeling one with the musical instrument) by stimulating the integration of the technical movements with the student's individual body language and their bodily responses to the music. This in-

tegrative approach emphasizes the basic mechanisms of entrainment and alignment and promotes expressiveness during the process of making music.

3. The role of the music teacher's body in music learning

3.1. The body of the teacher in classroom music education

Over the last few years, more empirical research has been done on how the music teacher's use their body in classroom music education (Bremmer, 2015; Bremmer, 2021a; Bremmer, 2021b; Chuang, 2010; Metz, 1989; Moor et al., 2020; Staveley, 2020).

Firstly, this research exemplifies that music teachers apply different types of gestures, that have different pedagogical functions. Prior to a music activity, music teachers often verbally explain and depict a music activity by using *instructional* gestures (Bremmer, 2015; Alibali & Nathan, 2007). As a result, students are not dependent on language to complete the activity because they are presented with a visual overview of it.

Furthermore, not to interrupt the music with verbal instructions, music teachers can apply *guiding* gestures to signal how and when students can respond during a music activity (Bremmer, 2021a, 2021b). Through these gestures, they mark the beginning or end of a piece of music, coordinate call-and-response music activities, or cue when to start singing during a round. Often, music teachers show such gestures well in advance so that students can respond in time; thinking ahead in music is therefore an important skill for music teachers (Bremmer, 2015). Moreover, through their guiding gestures teachers can help students to "latch on" to their body and, as such, might enhance entrainment (Bremmer). Music teachers also apply *representational* gestures, visualizing musical aspects such as the pulse, contour of a melody, dynamics, or expressive features of music (Bremmer, 2021a; Chuang, 2010; Moor et al., 2020; Staveley, 2020). Through such representational gestures, the invisible music is made visible for students.

Music teachers also apply physical modelling: teachers or a peer demonstrate a musical skill which students imitate (Metz, 1989; Moor et al., 2020; Staveley, 2020). This type of modelling invites students to entrain and align with rhythmic or expressive music elements communicated by the teacher or peer, allowing them to gain a felt experience of these elements. However, physical modelling also has

been criticized for its teacher-directed nature, as it might restrict students' musical creativity and self-expression (e.g. Burwell, 2012). Although this criticism seems legitimate, Bremmer (2015) illustrates that modelling also can be a dynamic, interactive process. For example, during a body percussion activity, music teachers can enlarge and emphasize certain rhythmic movements if they see that students have trouble learning certain rhythm patterns. Students, in turn, can respond actively to the teacher, evoking physical responses in the teacher who then can adjust the way of modelling again (Bremmer, 2021a).

Furthermore, music teachers can use their bodies to assess and to provide feedback on the students' music learning process (Bremmer, 2015; Metz, 1989; Moor et al., 2020). For instance, during a circle activity where everyone holds hands, teachers can feel and assess whether students can swing their hands on the pulse (entrainment), and if not, teachers can gently start swinging on the pulse as a form of feedback (Bremmer, 2015). Or, when music teachers observe that a student has trouble performing a rhythm, they can take the student's hands and play the rhythm with their hands (Moor et al., 2020).

Lastly, by making language less central in pedagogical instructions, music teachers have an opportunity to make active music making more accessible for different groups (Bremmer et al., 2021): a bodily-based, non-verbal music pedagogy might meet the specific needs, for example, of second language learners, young children, or students with disabilities.

3.2. The body of the teacher in instrumental and vocal music education

Empirical research also has been increasingly conducted on the role of the music teacher's body in instrumental and vocal education (e.g., Fatone et al., 2011; Kochman et al., 2014; Pearson, 2016; Simones et al., 2015; Van den Dool, 2018; Zorzal & Lorenzo, 2019). Like the research in general classroom music education, studies show that instrumental and vocal music teachers employ different types of pedagogical gestures, body movements and touch to guide their student's music learning process (Bremmer & Nijs, 2020).

Looking at pedagogical gestures, music teachers can (alternately) employ these to provide students with additional visual information, such as technical information (referring to technical solutions necessary to perform the music such as bowing, posture or breathing) musical information (re-

ferring to formal musical elements, such as pitch or beat of music), and expressive information (referring to expressive elements such as timing, dynamics, timbre or articulation) (see Chaffin & Logan, 2006; Meissner, 2021). For instance, singing teachers can provide *technical* information through gestures by visualizing a tongue position (Nafasi, 2013) or by demonstrating the (invisible) changes of the vocal tract and resonance space (Kochman et al., 2014). Music teachers can visualize *musical* information by gesturing the beat for their students (Simones et al., 2015) or the pitch (Pearson, 2016). *Expressive* information can be visualized for students, e.g., teachers can employ gestures to indicate a change in loudness and timbre or to indicate the qualities of attack and release (Pearson; Simones et al., 2015).

Gestures can also highlight those musical features of which the music teacher would like students to be aware (Pearson, 2016). Thus, gestures can function as an 'attentional anchor' (Abrahamson & Sánchez-García, 2016, p. 216). For example, when a student has trouble playing a syncopated rhythm in a band, the band coach can visualize syncopation through a gesture, aiding the student to focus on playing that syncopated rhythm correctly (Van den Dool, 2018). Furthermore, music teachers can employ gestures, with or without linguistic support, to remind a student of a previously discussed musical concept or skill (Kochman et al., 2014; Van den Dool). For example, vocal teachers might employ a musical or technical gesture during a vocal piece (e.g., keeping the jaw relaxed) to remind a student of a concept that was discussed earlier (Kochman et al.).

The teachers in instrumental and vocal education also use physical modelling as an instructional strategy: they can demonstrate a technical skill or play along with a student to provide an example of an expressive musical phrase (Simones, 2017; Van den Dool, 2018). Here, too, modeling offers the opportunity for students to temporarily "latch on" to the music teacher's body and to co-experience aspects of the music such as dynamics and musical phrasing or, by synchronizing with the teacher's pulse, students might physically feel the pulse of the music better (Bremmer & Nijs, 2020).

Lastly, music teachers use touch in the music learning process. In general, a teacher's touch goes through their hands (Zorzal & Lorenzo, 2019), and can be applied to receive and provide feedback. For instance, piano teachers can put their hands on top of those of their student, feel the posture of the hands and then 'adjust' the student's hands through touch (Simones et al., 2015). Or guitar teachers can employ touch to direct the student's attention to their pos-

ture or technical aspects such as the position of the hand (Zorzal & Lorenzo). In this way a student gains a kinesthetic sensation of a skill or musical concept (Staveley, 2020).

Conclusion

Based on theoretical and empirical research, we provided an overview of the role of the body in learning and teaching music. Research exemplifies that learning and expressing music in any type of music education can be enhanced by physical activities: movement helps students to feel the pulse of the music (entrainment), to hear and perform more (expressive) aspects in the music (interphase alignment), and it influences how emotions can be interpreted in music. The body of the music teacher is also essential to coordinate the performance of a musical activity, to give additional information by visualizing invisible aspects of music through gestures (phase and interphase alignment), to help students synchronize with the music (entrainment) through modeling, and to receive and provide feedback through touch. In our view, the presented work in this article has valuable implications for practice and further empirical research.

In practice, teachers can consciously apply the concepts of entrainment, alignment, and prediction to shape students' expressive interaction with music and with their peers, thereby facilitating a deeper understanding of the music (Bremmer & Nijs, 2022). Entrainment, for example, can be practiced during a drum activity: students can be invited to start drumming in their own tempo and, next, to find a common tempo. Or music teachers can invite students to work in dyads to practice phase and interphase alignment: one student can hold a hand drum and move it through the air to visually express the flow of the music (interphase alignment), while the other student follows the drum and taps the beat to it (phase alignment). Prediction can be practiced in a physical way, for instance, if students listen to a two-chord song, and jump away from their home base when they predict a change of chords (from I to V), and jump back to their base when they predict the change from V to I. This movement helps students to experience and predict a sense of tonic and dominant in a physical way (see Bremmer & Nijs, 2022 or Nijs & Bremmer, 2019 for more movement activities based on embodied music cognition). These types of bodily-based activities can support the learning and understanding of various music practices and provide students with a felt experience of music.

Furthermore, through language students' 'knowledge in music' can be broadened to 'knowledge about music'

(Bremmer & Nijs, 2022). Music teachers can invite students to discuss their personal feelings and ideas about (composing) music, to develop a shared language about theoretical aspects of music and to provide students with a language to (critically) situate music practices in broader, societal contexts.

At a more meta level, Juntunen (2020) observes that an added value of music integrated with movement lies in the fact that it provides students with a kind of embodied experience that integrates the physical, cognitive, social, and emotional in a way that rarely happens in everyday life. Therefore, students might not only deepen their musical learning process through embodied learning, but in addition they might develop cognitive, emotional, and social skills (Hallam, 2010).

Finally, a larger focus on embodiment requires, on the one hand, more attention to the role of body in music education in teacher education: future music teachers could be taught more explicitly about the theory and practice of an embodied music pedagogy, a pedagogy that seems to be key to the profession of music teachers (Bremmer & Nijs, 2022).

On the other hand, a larger focus requires more research that can further our understanding of the role of the body in the musical learning process, both theoretically and empirically (Bremmer & Nijs, 2020). For instance: when is an embodied pedagogy more effective for teaching certain musical concepts and skills in comparison to language, or how does a music teacher co-regulate emotions so that students do not become overwhelmed by a musical task? We hope that this article will invite teachers and researchers to reflect together and look for new insights, that are based on science but are especially relevant for practice.

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