frontiers in Education

CONCEPTUAL ANALYSIS
published: 03 December 2019
doi: 10.3389/feduc.2019.00141

Understanding the Meaningfulness of Vocal and Instrumental Music Teachers' Hand Gestures Through the Teacher Behavior and Gesture Framework

*Lilian Simones**

Graduate School, Queen's University Belfast, Belfast, United Kingdom

This article considers the usefulness of the recently proposed "Teacher Behavior and Gesture (TBG) framework" for understanding the meaningfulness of teachers' hand gestures from an Enactive Cognition perspective (wherein cognition is fundamentally considered as embodied, embedded, enactive and extended). The framework is based on the main premise that gestures are part of an integral musical communicational process, fully integrated with speech and/or music-making and contextualized within specific teaching behaviors. By considering teachers' teaching behaviors, it is possible to realize teachers' pedagogical intentions. This, in turn, enables deeper understandings on teachers' gestures from the points of view of meaning, function and purpose. Application of the TBG framework across instrumental and vocal music pedagogical contexts (one-to-one, small, and large teaching groups) will bring relevant insights on developing practical scaffolding approaches, with direct implications on the quality of teaching and learning, for the benefit of both teachers and students.

Keywords: vocal teaching, instrumental music teaching, gesture, gesture categorization, teachers' hand gestures, teachers' behaviors, enactive cognition

OPEN ACCESS

Edited by:
Dylan van der Schyff, Melbourne Conservatorium of Music, Australia

Reviewed by:
Elisa Kupers, University of Groningen, Netherlands
Michele Biasutti, University of Padova, Italy
Ricieri Zorzal, Federal University of Maranhão, Brazil

***Correspondence:**
Lilian Simones
l.simones@qub.ac.uk

Specialty section:
This article was submitted to Educational Psychology, a section of the journal Frontiers in Education

Received: *02 September 2019*
Accepted: *18 November 2019*
Published: *03 December 2019*

Citation:
Simones L (2019) Understanding the Meaningfulness of Vocal and Instrumental Music Teachers' Hand Gestures Through the Teacher Behavior and Gesture Framework. Front. Educ. 4:141. doi: 10.3389/feduc.2019.00141

INTRODUCTION

Broadly speaking, gestures can be defined as being composed of movements that carry intentions and/or perceived meaning/s sensitive to the contexts in which they are used (McNeill, 1985; Leman and Godøy, 2010); and they can assume a multiplicity of forms, functions, and meanings depending on the context in which they occur (Leman and Godøy, 2010). For instance, composers creating a musical work express themselves through notational motional patterns (i.e., gestures) that they use in abstract ways to express musical ideas. Music performers in all traditions bring music to life by embodying ideas that they themselves have generated, or that have been generated by others. These ideas are communicated through gesture and body movements aimed at producing the required sound (Simones, 2019). And, in vocal and instrumental music pedagogical contexts, teachers' gestures linked to verbal language, musical communicational elements and embedded in specific teaching behaviors, are vehicles of expression and communication that contribute to the generation of new meanings in teaching and learning processes (Simones et al., 2015a, 2017). Despite this importance, gesture is rarely afforded the pedagogical importance that it deserves in relation to instrumental and vocal teaching and learning processes. Even in light of recent critical

interest in this area, and some persuasive findings on the roles of gesture in vocal (e.g., Davidson, 2005; Rahaim, 2012; Pearson, 2016) and instrumental music pedagogical contexts (e.g., Simones et al., 2015a, 2017; Zorzal and Lorenzo, 2019), gesture remains mostly "unseen" to researchers in these contexts. Such invisibility constitutes a major impediment to understanding the meaningfulness of gesture and communication in general, especially in relation to vocal and instrumental music pedagogy. In such contexts, gesture is both an integral aspect of the musical gestural repertoire needed to embody the musical content; and it is deeply (communicatively) embedded in the process of "scaffolding" (Simones et al., 2015a) (more on scaffolding later). Several inter-related factors have contributed to this state of affairs, ranging from historical conceptualizations on the role and nature of gesture in learning processes, and the absence of a reliable framework for studying gesture in these particular contexts.

GESTURE IN MUSIC TEACHING AND LEARNING: AN OVERVIEW

Despite the relatively recent recognition of the roles of gesture in music performance, considerations of the importance of gesture and body movement in the context of music education emerged much earlier: in the nineteenth century, most particularly (anecdotally) in the work of Orff (1895–1982), Kodály (1882–1967), and Dalcroze (1865–1950). These pedagogues established different methods and approaches for including gesture and body movement within the parameters of music education, with varying levels of importance ascribed to gestural and movement components (Simones, 2015). The basic pillars of Orff's Schulwerk pedagogy are to teach music and movement "by doing" in a child-centered environment (see Orff and Keetman, 1950). Here the percussive rhythm is considered as a basic and natural form of human expression. Using gesture as an aid to the learning process rather than as an integral and central aspect for learning, Kodály (1965) adapted the hand signs devised by Curwen's (1816–1880) 'Tonic Sol-fa' system to denote grades of scales (see Curwen, 1858). There is a longer history at work here, because systems of hand gestures to aid learning of musical material have been used since ancient times as part of Coptic, Byzantine, Jewish liturgical chant practices and Gregorian chants (Rahaim, 2012).

Of the three intellectuals instanced above, Dalcroze was highly influential as he posed the idea that teachers' neglect of bodily considerations in the teaching and learning process was the reason that early twentieth-century conservatoire training was failing to instill musical expressivity and accurate rhythmical perception in learners (Seitz, 2005). His argument, that "musical expressivity is embodied—that is, resides in the physical characteristics of the body—and entails physical and social interaction with others" (Seitz, 2005, p. 420), paved the way for relatively recent empirical findings focused upon gesture in musical performance (e.g., Boyes Braem and Braem, 2000; Davidson and Correia, 2002; Wanderley and Vines, 2006; Dahl and Friberg, 2007; Poggi, 2007, 2011; Wöllner, 2008). The way that Dalcroze emphasized the body as the primary source of knowing, in a world still heavily influenced by a long philosophical tradition of disembodied rational thought as the source of knowledge (e.g., Plato; Descartes), is remarkable. It was only slightly later that the influential philosopher Merleau-Ponty (1908–1961) maintained that the body and what it perceives cannot be disentangled, essentially forming the basis of Embodiment Theory (see Merleau-Ponty, 1945). The crucial ingredients of the Dalcrozian teaching and learning method (entitled "Eurhythmics") are to be learned through bodily movement in "whole gesture songs"—intended to train the body to simultaneously internalize and respond to music (Jaques-Dalcroze, 1921/1967). Despite the relevance of such assumptions, it was only in 1997 that Dalcroze's views on the importance of movement in music education were approached empirically, through a study on the musical creativity of young children in nursery settings (Cohen, 1997) that produced striking findings. Cohen (1997) argued that cognition has roots in kinaesthetic gestures that powerfully affect musical teaching and learning because they act as a pedagogic tool capable of transforming the mind's musical developmental process. Roughly a decade later, Overy and Molnar-Szakacs (2009, p. 486) proposed that "music is perceived not only as an auditory signal, but also as intentional, hierarchically organized sequences of expressive motor acts behind the signal," highlighting a need for clarifying music teachers' roles in the mediation of musical knowledge.

The educational-psychology notion that "we become ourselves through others" (Vygotsky, 1966, p. 40) implies that biological predispositions toward musicality are shaped and developed through interactions with other people, groups, institutions, and situations within a certain culture (see McDonald et al., 2002). For instance, the similarity in students' gestures to their teachers is outlined both by a recent study focused on Hindustani music (Rahaim, 2012), and registers informally in the context of western classical music: "Anecdotally I have been able to identify the students of my colleagues by the way not only how they hold their instruments, but by the expressive gestures employed" (Davidson, 2012, p. 774). Additionally, Pearson (2016) has observed that teachers' and students' gestures function as attitudes that bring forth responses and have an important role into how teacher and student adjust to each other.

It is apparent, then, that vocal and instrumental music teachers' gestures embody music and teaching, and play an important role in how effectively teachers promote enactment of music and music learning in these contexts. Such being the case, gestures should be considered from an Embodiment Theory perspective. At the heart of Embodiment Theory is the idea that knowledge is generated through the experience of an individual in her/his world which arises and evolves primarily through the sensing body in interaction with the environment. Accordingly, cognition is understood to be inseparable from corporeal existence—the 'mind' is therefore necessarily and essentially embodied (see Merleau-Ponty, 1945; Varela et al., 1991). Taking the body's perceptual and motor capacities as point of departure for human cognition implies that mental processing is inseparable from the body, and that emotion,

language, memory and other processes are enmeshed (Winold and Thelen, 1994; Thompson, 2005). As (Schiavio et al., 2019) put it, there is no separation between: low- and high-level domains of cognition; conscious or unconscious physical actions; or abstract thought. And this is evidenced, for example, in the way that co-verbal gestures and speech both integrally co-articulate in communication (McNeill, 1992; Goldin-Meadow, 2003).

A vast amount of research conducted over the past three decades has highlighted that musical making and music communication (be it in performance or in music education) integrally involves bodily gestures, actions, and movements; and these processes are not necessarily language-based (Barrett, 2005; Simones et al., 2015a,b; Schiavio et al., 2018, 2019). While embodiment realizes the importance of the body and bodily actions in cognition, expanding this notion further, Enactivism Theory asserts that cognition arises through the dynamic interaction between body, environment, and people—including, importantly, teachers (Varela et al., 1991; Gallagher, 2005). Enactivism Theory considers the mind in accordance to four main dimensions, known as the 4Es: as *embodied* (in terms of how interactions between body and environment shape the mind); *Enactive* (enacting processes for creating a meaningful world); *embedded* (situated in a context-dependant environment, in social, cultural, physical and environmental dimensions); and *extended*, wherein mental processes are considered to extend beyond the mind in itself to include technologies, objects, socio-cultural interactions, and an array of organic and inorganic elements (van der Schyff, 2017). Frameworks aimed at considering the meaningfulness of vocal and instrumental music teachers' gestures necessarily need to consider the 4E dimensions which are embedded in the process of "scaffolding" in the specific contexts in which gesture occurs.

SCAFFOLDING

Instrumental and vocal music teachers support learners acquiring musical knowledge and skills for communicating and enacting music, and they do so through "scaffolding." Scaffolding refers to the specialized instructional support in place to best facilitate learning when students are introduced to a specific task or subject, in mediated dynamic interactions between the individual and relevant others, such as teachers (see Bruner, 1966; Piaget, 1970; Gross, 1974; Wood et al., 1976; Vygotsky, 1978; Lave and Wenger, 1991; Salomon, 1993; Schirato and Yell, 2000; Amsel and Byrnes, 2002; Barrett, 2005). Vygotsky (1981) points out that when an adult and child are intended to share the same situation they need to create an "intersubjective situation"—one in which they can both share and synchronize their way of perceiving objects and creating action patterns. The "cultural sign" in this scenario works as a mediator for establishing this intersubjective situation, and aid in the process of scaffolding. "Cultural signs" consists of the means used by members of a certain culture in this process, such as an "indicatory gesture" (Vygotsky, 1986), "verbal directives" (Saxe et al., 1984), "eye gazes" (Wertsch et al., 1980), "counting" (Saxe, 1979), and an "external object as a reminder" (Vygotsky, 1981).

A recent study (Simones et al., 2015a,b) compared the gestural behavior of three piano teachers while giving individual lessons to students with differing piano proficiency levels. Poisson regression[1] analysis and qualitative observation suggested a relationship between teachers' didactic intentions and the types of gesture they employed. This was demonstrated by differences in gestural category frequency according to student proficiency levels. The report recorded continuity between teachers' gestural approaches in relation to specific student proficiency levels. This indicates a teacher's gestural scaffolding approach—i.e., teachers adapted gestural communicative channels to suit specific conceptual skill levels in their students. Conducted using the TBG framework (more detail on the framework and how to use it in the next section), this study provides an original contribution to literature in music psychology on the topic of scaffolding which has traditionally been studied in relation to verbal communicational channels (e.g., Wood et al., 1976; Saxe et al., 1984; Adachi, 1994; Kennell, 2002). At the heart of Kennell's (2002) "Teacher Scaffolding Model," created specifically for the instrumental music teaching context, is the idea that the teacher selects and introduces specific tasks just beyond the student's current capabilities, which are accessible to the student only with the help of a competent teacher. From his observational findings, Kennel concluded that teachers' choice of scaffolding strategy is based upon teachers' attribution of the reasons why a student's performance succeeded or failed. Other attempts at identifying scaffolding processes in the instrumental teaching context include Gholson (1998, p. 539–540), who grouped teachers' strategies as "preparatory" (precursors of instructional intervention) and "facilitative" (promoting a comfortable lesson, marking critical features of content, use of metaphor and focusing on students' weaknesses) (See also Adachi, 1994; Barrett, 2005; Young, 2005; Biasutti and Concina, 2018). Rosenthal (1984) studied the effectiveness of instructional strategies in college music instruction by submitting participants to a number of audio recorded conditions as follows: (a) verbal instruction only; (b) model instruction only (using an aural model only); (c) a combination of verbal and model instructions and (d) practice only. The results suggested that the model-instruction-only strategy produced greater student learning outcomes, evidenced by the number of student-correct-performed-measures. This researcher therefore concludes that aural-only conditions (which she considered the equivalent to demonstrations) are effective teaching strategies.

As noted above, the lack of research into gestural scaffolding processes is striking, despite research in the fields of psychology and psycholinguistic revealing a correlation of gestures with intersubjectivity levels between people in terms of sharing

[1]Poisson regression analysis was used as the data consisted of frequencies of categorical data to compare teachers' gestural performance while teaching two student groups of different proficiency levels. This method gives the difference between frequencies of each gesture type performed by teachers for each student group, in the form of a ratio (if there is no difference at all between the two student groups the ratio is equal to 1. In the mentioned study two Poisson regression analyses were conducted respectively on 1) totals of combined teachers' gesture type occurrences per student group and 2) total individual teacher gesture type occurrences per student group.

thoughts, feelings, and linguistic meanings (Zlatev, 2008; Nathan and Alibali, 2011). This indicates that gestures play important roles in these types of reciprocal interactions. Intersubjectivity involves not only understanding beliefs and other proposition-like entities, but also other less explicit forms of consciousness, such as emotions, attitudes and intentions (see Tomasello et al., 2005). It has been suggested that such an intrinsic way of understanding involves identifying with others on a direct bodily level, and connects with gesture's role in this important process (Merleau-Ponty, 1945; Donald, 2001; Gallagher, 2005; Zlatev et al., 2005). It is therefore apparent that communication is a contextualized practice and should be approached with a focus upon "communicative practices that are not solely dependent upon language-based thought" (Barrett, 2005, p. 264).

GESTURE IN VOCAL AND INSTRUMENTAL MUSIC TEACHING

As a response to this complex picture, recognition of the importance of gesture in vocal and instrumental music pedagogy is slowly gaining traction. Partly, this recognition has been paved by findings that gesture helps learning in a variety of disciplines (e.g., Cook and Goldin-Meadow, 2006; Cook et al., 2008, 2010, 2013; Sassenberg, 2011). It has also been bolstered by findings from research into gesture in music performance, leading to considerations on the role of educational practices and specific learning contexts in the way that performers and conductors use gestures during performances (Boyes Braem and Braem, 2000; Davidson and Correia, 2002; Wanderley and Vines, 2006; Dahl and Friberg, 2007; Poggi, 2007, 2011; Wöllner, 2008). The close interplay between singing and speech—in which gesture is "seen" as a shared communicational channel aiding meaning to both singing and speech (even when singing without words), albeit with added technical functions for singing—might explain why gesture in vocal pedagogy was noted first by researchers (Simones, 2015). Considerations first emerged in the choral environment where gesture is considered an important music learning element. Wis (1993) attempted to establish a theoretical framework for considering gestures used in day-to-day life as a supplementary element to express both musical and vocal concepts. Indeed, the use of movement and gesture in choral singing has been shown to improve aspects such as tempo, tone, articulation, intonation and singing posture (Hibbard, 1994; Chagnon, 2001; Bailey, 2007; Crosby, 2008).

Specifically in the pedagogical context of singing (western and non-western), a number of studies confirmed that singing teachers frequently use movement and gesture in their teaching practices, and that the singer's coordination and song narrative expression relies, in many cases, upon non-verbal codes similar to those used in speech (Clayton, 2005; Davidson, 2005). This led to assumptions that gestures used in music performance (for singing and other instruments) would mirror speech patterns. Such assumption led music researchers such as Davidson (2005) and Clayton (2005) to import co-verbal gesture classifications developed by researchers working in the field of Psycholinguistics (i.e., Kendon, 1980; McNeill, 1992; Cassell, 1998) into their studies of gesture in music performance. Unfortunately, however, parallels established between the meaningfulness of gestures in the context of music making and that of co-verbal gestures have contributed to the intrinsic specificities of music communicative processes in music to be overlooked. Quite simply, this is because there are many cases where music cannot be described through words.

Examples of this include instances where touch was examined (as a gesture) for teaching the essential haptic contact required to play a musical instrument, and as a form of establishing communication with others. Zorzal and Lorenzo (2019) consider the role of touch for teaching guitar in masterclass contexts, concluding that teachers use touch in accordance to their perception of students' performance problems, and also that touch has a role in teaching aspects inherent to playing the guitar, such as attaining appropriate body posture. Simones et al. (2015b) in the piano teaching context revealed that touch proved to be an important tool in the context of piano teaching for communicating a variety of different elements: the type of movement and physical posture of the hand, fingers and body; the kinaesthetic sensation that should be felt and applied to the piano keys in order to produce the desired tone; preparing to start and/or end the sound producing gesture; and the weight of the hand for pressing keys.

Teachers gestures are also profoundly interrelated with intrinsic musical components. Focusing on gesture in Karnatak music (an Indian genre acutely-oriented to the voice: even when instruments are used alone they are played mostly in imitation of song), Pearson (2016) shows various examples of how musical and gestural practices are connected to and embedded within in each other. This relationship functions through body motions intrinsic to both. Pearson argues that Karnatak music is best conceptualized, then, as composed from units and longer motifs which can be considered as "gestural-sonic chunks" (as per Leman and Godøy, 2010 definition of this term). In other words, the segments of music in which notes are contained, are categorized under the wider gestural motion that produces them. In alignment with Rahaim's (2008) work on Hindustani music, Pearson (2016, p. 240) also argues that teachers' co-singing gestures "contribute to indicating points of emphasis and de-emphasis, while also mapping qualities of musical motion." Furthermore, an important role was ascribed to observation and imitation of teachers' action demonstrations for piano students' learning to perform a specific type of staccato, especially in terms of knowledge retention (Simones et al., 2017). In this experiment, beginner, and intermediate level piano students were submitted to three different (*group-exclusive*) teaching conditions: an audio-only demonstration of the musical task; an observation of the teacher's action demonstration followed by student imitation (*blocked observation*); and an observation of the teacher's action demonstration while alternating imitation of the task with the teacher's performance (*inter-leaved observation*). Student staccato learning was evaluated by (a) sound vs. inter-onset duration ratio (in relation to the staccato sound definition used in the study), and (b) range of wrist angle (in accordance with the action demonstration employed during the experiment, and calculated as the difference between students' wrist flexion

and extension in degrees). Demonstrating that certain teaching and learning conditions, involving different combinations of observation and imitation elements are more effective than others, this study ascribed an important role to teachers' gestural demonstrations in piano pedagogy by mapping them directly to student learning outcomes.

Gestural demonstrations cannot, however, be considered outside of the social and cultural contexts in which they occur. Emphasizing the effects of social and cultural elements on teaching and learning, Dunbar-Hall (2006) conducted a case study of performance-based teaching and learning of Balinese gamelan by Australian students. He suggests that an embodied understanding of social and cultural beliefs and practices have an influence on kinaesthetic and aural musical learning, particularly in relation to memorisation and hierarchical interdependence of sonic elements. Dunbar-Hall accords an important role for teaching processes and recognizes the need for potential ethnomusicological dimensions geared toward music education, particularly in what accounts for broadening teachers' musicianship and pedagogical strategies. And for such musicianship and pedagogical strategies to be as comprehensive as possible they need to include considerations on how gesture performed by teachers can promote and facilitate learning through bodily action.

CHALLENGES IN FRAMEWORK CONCEPTUALIZATION

Apart from historical assumptions regarding the role and nature of gesture in learning processes (as considered above), there have been a number of conceptual and methodological challenges which have delayed conceptualization of reliable frameworks for studying vocal and instrumental music teachers' gestures. Firstly, music performance has mostly been considered as a final construct, and therefore considerations on how teaching and learning influence movement/gestural features during musical performance have often remained overlooked (e.g., Davidson, 1994, 2001, 2005; Wanderley and Vines, 2006; Dahl and Friberg, 2007; Poggi, 2011). This situation was so, even in light of gesture being ascribed a crucial role in the learning process across a range of other subjects, such as mathematics and languages (e.g., Cook and Goldin-Meadow, 2006; Cook et al., 2008, 2010, 2013; Sassenberg, 2011). Furthermore, in earlier attempts to study gesture in instrumental teaching, gesture was (and, in some cases, is) considered under the term "non-verbal behavior" (e.g., Gipson, 1978; Levasseur, 1984; Hepler, 1986; Carlin, 1997; Kurkul, 2007). This term has contributed to both a tendency to consider the so-called non-verbal behavior in isolation from associated verbal, musical content and other multimodal behavior—contributing to an implicitly reductionist view of the role and importance of gesture by ascribing a submissive role to gestures in relation to verbal content. Examples of how the non-verbal behavior term can be misleading includes categories set by previous researchers, designated as "facial expression and eyes" (e.g., Levasseur, 1984), and "physical initiating" (e.g., Gipson, 1978), which often occur alongside verbal behaviors, and which need to be considered in relation to verbal elements and integrated in specific teaching behaviors.

In the absence of a context-specific terminological and methodological framework for studying gesture in instrumental music teaching, gesture definitions, and categorisations used in other contexts (music and non-musical) were introduced. This included appropriating gesture definitions and categorisations developed in the fields of psycholinguistics, music performance, and other fields (e.g., Clayton, 2005; Poggi, 2007; Rodger et al., 2012; Nafisi, 2013). However, definitions of gesture and organizational models drawn from other fields need to be carefully considered prior to implementation because instrumental music teachers use gesture in unique ways. Examples of the difficulties encountered include overlapping gesture categories—evident when attempting to use Jensenius et al.'s (2010) functional categorization of musical gestures to instrumental music pedagogical contexts. Jensenius et al. (2010) amalgamates previous functional musical gesture classifications, including the gesture categories of *sound producing*, *sound facilitating,* and *sound accompanying*. It became apparent that most of teachers' gestures could be considered simultaneously as *sound producing* and *sound facilitating*; and, in cases where teachers perform simultaneously with the student, it could as well be considered *sound accompanying*.

Making distinct gesture categories is challenging, especially in differentiating between "gestures" and "body movements." The work of Nafisi (2013) exemplifies how difficult this undertaking can be, as her proposed categorization of singing teachers' gestures lacks specificity in the terms given to gesture types. For example, Nafisi dissociates gestures performed alongside physiological visualizations from the musical gestures in themselves, when it appears that such physiological gestures have (at the very least) deep musical intentions and practical musical applications. Besides encompassing what can be considered "metaphoric" and "iconic gestures" (McNeill, 1992), Nafisi's gesture category "Sensation related" seems also to imply that there are sensations and emotions associated with these gestures which, could well be the case. However, the author does not assess this element at an empirical level. And, through this exclusion, the project ignores other sensations that could occur during other gesturing instances, not to mention those that might occur alongside the embodied and deeply kinaesthetic experience of making music. Moreover, the devised classification system remains incomplete given that it only considers gestures associated with the singing process, ignoring other communicative instances that may occur between teacher and student which are nevertheless essential in the pedagogical process as a whole—instances such as verbal communication that may or may not be associated with singing. Finally, the survey methodology (a questionnaire completed by singing teachers relating to the nature and types of gestures they perform while teaching), is not substantial enough for adequate empirical consideration. This is the case as gestures can occur unconsciously and unintentionally, as well as consciously and intentionally, and in either case gesturers are, in many (if not most) cases, unable to recall exactly how they gestured. For this reason, gesture studies often base their findings on qualitative

observations of video-recorded material, and follow rigorous procedures where data is observed and categorized by different annotators. Inter-annotational agreement is checked against Bakeman and Gottman's (1986) requisites for observational techniques, and these procedures are made possible with the use of the TBG framework. Although Pearson (2016) argues that the polysemous nature of gesture—in which a single hand motion can have several functions and meanings—renders categorization of gestures problematic, this concern is addressed in the TBG framework by classifying gestures in relation to their form and shape, within specific teaching behaviors. This way sharper definitions can be reached.

THE TBG FRAMEWORK FOR STUDYING THE MEANINGFULNESS OF INSTRUMENTAL AND VOCAL TEACHERS' GESTURES

The fundamental premise of the TBG framework (Simones, 2019) is that it considers gesture as part of an integral musical communicational process that is fully integrated with speech and/or music making. It must also be embedded in varied multimodal behavior and contextualized within specific teaching behaviors. I have argued elsewhere that teacher gestures in the vocal and instrumental music contexts be defined as spontaneous movements of teachers' hands and/or arms, accompanying either speech (McNeill, 1992) or music-making activities (with or without speech), and that they carry either an intention (Gritten and King, 2011), perceived meaning (Hatten, 2006), or both (Simones et al., 2015a,b). In this way, I account for teachers' essential communicative intentions in the teaching process. The meaningfulness of teachers' gestures in vocal and instrumental music teaching can be considered and realized as embedded in teachers' specific pedagogical intentions and musical communicative functions. Because teachers teaching behaviors are delimited behaviors performed (during lessons) with specific pedagogical intentions and functions, such behaviors offer a reliable context-dependant base on which to consider the meaningfulness of gesture, as I will further demonstrate.

More specifically, and as documented in music education literature, teachers enact a variety of different teaching behaviors with distinct pedagogical functions/intentions (Carlin, 1997; Zhukov, 2004; Simones et al., 2015a). In particular, teachers **provide information** to students (explaining new concepts, reiterating known concepts, providing logistic information in regards to upcoming concerts, and other elements). Teachers **provide feedback,** whereby they evaluate student's applied and conceptual knowledge and make their judgement known to the student, and **give advice** in the form of specific opinions or recommendations aimed at guiding the student toward the achievement of particular specific aims. They also **ask questions** and provide **practice suggestions** for a particular element or passage or a specific practicing schedule. Instrumental and vocal teachers often **demonstrate** how a specific passage should be played, the required rhythm or phrase intonation; or more actively engage the student in performing actions alongside teachers' explanations through **modeling**. Necessarily, teachers **listen and observe** what students say, play and do. For further information on the teaching behaviors categorization and definition of each teaching behavior as used in the TBG framework, please see **Table 1**.

In relation to gestures, the categories used in the TBG framework include spontaneous co-verbal gestures devised by McNeill (1992, 2005) which are used by all human beings for day-to-day communication and spontaneous co-musical gestures (Simones et al., 2015b) which teachers spontaneously use while teaching music. In what accounts for spontaneous co-verbal gestures, in one-to-one instrumental contexts teachers were observed performing pointing gestures for instance, to highlight elements in the music score and aspects in posture and hand position (**deictic gesture**); they have also gesturally expressed images of actual objects or actions (such as drawing a legato sign in the air, or expressing the physical action required to perform staccato) (**iconic gesture**) and images of abstract concepts (for example wide open hand gesture to imply that something was huge) (**metaphoric gesture**); Vertical/perpendicular movements of the hands and head were also used to highlight parts of the verbal content, such as a specific word, or part of a phrase (**co-verbal gesture**). And in regards to spontaneous co-musical gestures, teachers were observed enacting up and down movements of hands, arms, and/or head to indicate the speed or tempo at which the music should be played (**musical beats gesture**); teachers also performed up and down movements of hands and arms that generally assumed a rounder shape to provide temporal and expressive information about the music (**conducting style gesture**); they played the musical instrument they were teaching at specific instances during the lesson or sung (isolatedly or even simultaneously) (**playing a musical instrument or singing gesture**); teachers represented and expressed an action by performing the action, action sequence or movement which they considered beneficial for performing a particular musical task, musical phrase, or other musically related issues, while expecting the student to imitate such action or movement (**mimics gesture**); and, there were instances where teachers made intentional physical contact with the student in the course of instrumental music teaching to develop the required hand position or posture and communicate certain types of touch needed to achieve certain intended sound qualities (**touch gesture**) (Simones et al., 2015b) (See **Table 1**).

While teaching behaviors associated to related verbal and musical content can indicate teachers' pedagogical intentions. Gestures, although at times having the exact same gestural features (form, shape, contour), can assume different meanings, purposes and functions, depending on the specific teaching behavior where they have occurred. Consider **Table 2** below, consisting of an annotation template. Here it is possible to observe that there were two occurrences of deictic gestures (pointing gestures). The first was undertaken within the context of a teaching behavior of giving information, aimed at helping the student visualize where exactly she was at a specific point in time while reading and playing music from a musical score. The second deictic gesture occurred within a teacher behavior

TABLE 1 | Categorisations used in the TBG framework.

CATEGORIZATION 1: TEACHER BEHAVIOR CATEGORIZATION		
Adopted and adapted from Carlin (1997), Zhukov (2004)	Giving information	Providing general and/or specific conceptual information
	Giving advice	Giving a specific opinion or recommendation aimed at guiding the student toward the achievement of certain specific aims, without demonstration or modeling
	Asking questions	Enquiring
	Giving feedback	Evaluation of a student's applied and/or conceptual knowledge made known to the student
	Demonstrating	Showing how to perform a particular action, without actively engaging the student in the action and where the student mostly listens and observes
	Modeling	Actively engaging the student in performing actions alongside teachers' explanations
	Giving practice suggestions	Provision of suggestions of ways to practice a particular element or passage, or discussing a practicing schedule
Simones et al., 2015b	Listening/observing	Internally processing the material presented and performed by students for diagnosing students' needs in musical development and establishing appropriate teaching plan to the student
CATEGORIZATION 2: TEACHER GESTURE CATEGORIZATION		
Spontaneous co-verbal gestures (McNeill, 1992, 2005)	Deictic	Pointing
	Iconic	Express images of actual objects or actions
	Metaphoric	Express images of the abstract
	Co-verbal beats	Vertical/perpendicular movements of hand, arms and/or head with the purpose of highlighting information that is external to the gesture in itself, occurring at the meta-level of discourse
Spontaneous co-musical gestures (Simones et al., 2015b; Simones, 2019)	Musical beats	Up and down movements of hand, arms and/or head that only denote the tempo or speed, at which the music should be played without providing expressive musical information
	Conducting style	Up and down movements of hand and arms that assume generally a more circular shape providing temporal and expressive information about the music
	Playing musical instruments or singing	Instances where teachers intentionally and actively engage with music making in the form of instrumental and/or vocal music making
	Mimics with instrument manipulation	Instances where teachers appear to mimic a certain mental image of a gesture that they consider appropriate to perform a particular musical sound-producing action, delivered while expecting the student to imitate the gesture shown Mimics can be subdivided into two sub-categories (only for instrumental music teaching): a) Mimics with instrument manipulation b) Mimics without instrument manipulation
	Touch	Instances where teachers have made intentional physical contact with the student in the course of instrumental music teaching

TABLE 2 | Annotation template example A.

Time in minutes/ seconds	**3:04**	**4.24**	**4.31**	**4.33**	**4.45**	**4.50**
Speech Transcript	Look, you are here now	That sounded much better than last week	There were only a few mistakes	What is this note here?	Yes, it's a G sharp, but you played G natural actually	listen, this is how it should sound when you play G sharp
Teaching behavior	Giving information	Giving feedback	Giving feedback	Asking questions	Giving Feedback	Demonstrating
Teacher gestures	Diectic	Co-verbal beat	Co-verbal beats	Diectic	Co-verbal beats	Playing the piano
Gesture meaning/function/ purpose	visualizing location in music score	Emphasizing the word "better"	Emphasizing the words "few" and "mistakes"	Checking for understanding	Emphasizing the words "yes," and "G natural"	Providing audio representation of correct sound

TABLE 3 | Annotation template example B.

Time in minutes/seconds	**7:08**	**7:15**	**7:18**	**7:21**	**7:25**	**7:31**	**7:43**
Speech Transcript	See how I use my wrist here to play the staccatos…	For each staccato my wrist goes	Down and then up, you try	No, not quite	Can I hold you wrist to show you?	Now you try again	Well done! That was brilliant
Teaching behavior	Demonstrating	Giving information	Giving information	Giving feedback	Asking question/modeling	Listen/observation	Giving feedback
Teacher gestures	Mimic with instrument manipulation	Co-verbal beat	Iconic gestures (for down and up using the wrist in the air)	No observable gestures	Touch (holding wrist) and mimics	No observable gestures	Touch (student's shoulder)
Gesture meaning/function/ purpose	Intended for the student to observe and imitate the gesture shown	Emphasizing the word "staccato"	Showcasing and designing in the air the down and up trajectory	–	Guiding student's action	–	Reassurance and congratulating the student on his achievement

of asking a question to check whether the student understood the information written in the musical score. These two deictic gestures, although assuming the same gestural shape and contour (and in this specific case both consisting of pointing gestures aimed at the musical score), have assumed different pedagogical functions as embedded in different teaching behaviors. The first deictic gesture represented in the annotation template was aimed at providing visualization of location within the musical score, and the second aided the process of checking for student's understanding of score reading.

Now consider **Table 3**. Here there are two occurrences of touch gestures. The first one occurred within a modeling teacher behavior, aimed at guiding the student's wrist movement through touch and modeling for learning to play a specific type of staccato. The second took place as the teacher provided feedback on the student's learning and used for congratulating the student on effectively learning to perform the intended task. The touch used in each of these two instances had clear pedagogical intentions which were in itself different from each other.

As seen in the two examples provided above, the TBG framework provides a platform for considering the meaningfulness of vocal and instrumental music teachers' gestures. It does so, by comprising two categorisations that work in an integrated manner: (1) categorization of teaching behaviors; and (2) categorization of teachers' gestures (see **Table 1**). By considering and differentiating teachers' teaching behaviors, it is possible to realize teachers' pedagogical intentions. This, in turn, enables contextualization of gesture within specific teachers' teaching behaviors and consequently allows for deeper understandings on their gestures, from the points of view of meaning, function and purpose. The teachers' teaching behaviors and gesture categorisations used in the TBG framework emerged from a previous study where 639 teachers' gestures were observed via video-recordings of 18 piano lessons, delivered by three teachers (Simones et al., 2015b). The teachers were unaware of the focus on gesture. Gestures were considered from the perspectives of shape/contour, contextualized pedagogical meaning expressed partially through teacher behaviors, and partially through the simultaneous use of verbal and other musical behavior elements. The categorisations used in this framework arose from adaptations made to previous teaching behavior and gesture categorisations. Through repeated observations of the collected data, new categories were conceived in relation to continuities with earlier categorized forms (For more information on categorization conceptualization, see Simones, 2019).

As seen in **Tables 2** and **3**, when using the TBG framework it is helpful to annotate data by taking into account the sequence of events captured vertically and horizontally. This should be considered in relation to how gestures occur in time, considering variables such as transcript of verbal content, teacher behaviors, and teacher gestures, using the proposed categorisations. Software tools for gesture annotation are very useful for allowing the observation of video-recorded material on a timeframe scale—and also for enabling multi-layered transcription of verbal content, teaching behaviors, gestures and any other elements in consideration. It is possible to distinguish how different elements combine in time, almost as if reading a music score of polyphonic music. Software tools freely available from the internet for annotation purposes include Elan software (developed by the Institute of Psycholinguistics, Nijmegen (Netherlands): https://tla.mpi.nl/tools/tla-tools/elan/; for an overview and tutorial see Lausberg and Sloetjes (2009) and Anvil software (available at http://www.anvil-software.org/). Both Elan and Anvil software are helpful at this level and can be used by researchers attempting to answer a variety of research questions in relation to the use of gesture in vocal and instrumental music teaching and learning, as they are specifically designed for manual annotation and transcription of audio or video recorded material, using a

tier-based model for inserting data. For examples of annotations made using Elan software, please see **Appendixes 1** and **2**. An important aspect to consider when conducting observational studies of video-recorded material is the need for assessing the reliability of annotation—i.e., by having different people observing and categorizing the data into agreed and pre-defined categories. Inter-annotator reliability assessments (in accordance with Bakeman and Gottman's (1986) requisites for observational techniques) provide the possibility of evaluation (by others) of the implicit subjective element of a researcher's observation, while ensuring validity and reliability.

Although the TBG framework has emerged from a study focused on one-to-one piano teaching, given the broader character of the categories devised I foresee this framework as fully applicable to vocal and other instrumental music teaching contexts, in a variety of settings including teaching one-to-one, small, and large groups. This is justified because:

- The teacher behavior categories are broad and all teachers in instrumental and vocal music teaching contexts, regardless of setting, will enact the teacher behaviors described.
- The gesture categories devised include spontaneous co-verbal gestures (McNeill, 1992, 2005) used by all humans in day-to-day communication interactions and spontaneous co-musical gestures (Simones et al., 2015a,b) which teachers spontaneously enact while teaching.

MOVING TOWARD AN ENACTIVE GESTURAL SCAFFOLDING APPROACH THROUGH THE TBG FRAMEWORK

The TBG framework moves away from mental processing models (Broadbent, 1958; Neisser, 1967) toward a vocal and instrumental music pedagogy which considers embodiment and Enactivism Theory at the heart of the teaching and learning processes (Varela et al., 1991; Gallagher, 2005).

Since the TBG framework considers verbal content and music communication, as embedded in specific teaching behaviors and gestures, it provides a holistic view of the teaching process, which can help us more fully understand how teachers scaffold learning while teaching students of various ages, different levels of proficiency and in different pedagogical and cultural contexts. By simultaneously acknowledging teaching behaviors, gestures and associated verbal content, it becomes possible for researchers to consider vocal and instrumental music teaching from an Enactive Cognition point of view, in relation to the 4Es' dimensions: embodied, enactive, embedded, and extended. In regards to the **embodied dimension**, which considers how interactions between body and environment shape the mind, through its focus on teaching behavior and associated gestures, the TBG framework is finely tuned to analyzing modes of understanding contingent perception and action in the teaching process. It does so by examining what in the teaching and learning dynamic motivates teachers to enact specific teaching behaviors while providing a contextualized overview of teachers' gestures in the process. Once the TBG is further developed to the point where students' learning behaviors may be equally annotated and included in the analysis, use of this framework will potentially provide insights into how teachers' teaching behaviors and gestures can help shaping students' learning.

The **enactive dimension** examines processes for creating a meaningful world whereby individuals use their own agency and autonomy to bring forth and enact a world aligned with their own beliefs and values. By considering verbal content and musical communication processes as symbiotically aligned to teaching behaviors and gestures, it becomes possible to document the processes that teachers bring forth to enact holistic teacher-student learning environments. Use of the TBG framework can therefore provide insights into scaffolding processes and the dynamic between teaching and learning. The analysis can include considerations on teachers' beliefs and values in regards to teaching (as they express themselves verbally, musically, gesturally and behaviorally). This can potentially lead to discussions on how teachers' beliefs and values influence teaching and learning and contribute to meaningful learning journeys for students.

The **embedded dimension** considers how learning is situated in a context-dependant environment, including social, cultural, physical and environmental dimensions. These dimensions shape and are shaped by people. Individuals develop different ways of perceiving, relating, and interacting with the environment in what has been designated elsewhere as "maximal adaptation" to the task and to the environment (Gibson, 1966, 1977; Ericsson and Lehmann, 1996). In addition, from an enactivist perspective, individuals are acknowledged as part of a dynamic system that comprises tools, environment, and any other individuals related to the task-environment, and where bodily actions, considered from a view of interacting with the world can be internalized as thought (see Bruner, 1966; Vygotsky, 1966; Piaget, 1970). This implies a biological conditioning for learning through bodily actions which leads to the idea that "the body and its dynamic relationship with the world are a fundamental component of musical literacy at all levels of development and musical cognition" (Philpott, 2001: p. 80). More specifically, it is assumed that "learning is the development of new skills via goal-oriented attunement to affordances in fields of promoted action" (Abrahamson and Sánchez– García, 2014), and that training "tunes" the learner to attend to selective elements in the environment that can be relevant for performing a given task (Vilar et al., 2012). Affordances are properties of the environment that support possibilities for action, and in which individual engagement in action is conditional for people' s experience, cultural framing, motivation, etc. (Gibson, 1977). The TBG framework holistically combines element of numerous variables (teaching behaviors, verbal content, gesture and other elements) and by doing so situates the specific teaching and learning processes within a context-dependant environment (social, cultural, physical, environmental, etc.). Moreover, by focusing on the above mentioned variables it can establish considerations on properties of the environment that support both teaching and learning, and this way provide information on the so-called affordances.

The **extended dimension**, highlights that mental processes extend beyond the mind in itself to include technologies,

objects, socio-cultural interactions, and an array of organic and inorganic elements. Use of the TBG framework acknowledges socio-cultural interactions of teachers with their students, and interactions with musical instruments and other elements that may be involved (i.e., technology, music scores, other); this way, the framework acknowledges that mental processes extend beyond the mind to involve other people and tools (Malafouris, 2013; Krueger, 2014).

Although the above 4Es dimensions are at the heart of Enactive cognition, van der Schyff (2019) points out that these dimensions stem from three main overlapping principles which are necessarily equally integral to the TBG framework. These are autopoiesis, sense-making, and autonomy. Not only these dimensions contributed to the generation of the TBG framework when I sought to understand how teachers communicate symbolic and functional musical knowledge to students, but also, the use of the framework has the potential of generating deeper insights into how these principles are enacted by vocal and instrumental music teachers, as further explained below.

Autopoiesis can be defined as how a creature self-organizes with its environment (Thompson, 2007). Is not, therefore, a process whereby individuals simply react or respond to their environment. Rather, using their agency, they reach out to create a world that is compatible with their requirements, beliefs and value systems, while attending to selective elements in the environment that can be relevant for performing a given task (Vilar et al., 2012). Instrumental and vocal teachers' teaching behaviors and their gestures occur as a result of the interaction they continuously establish and develop with their students and are a demonstration of how teachers self-organize within the environment of each specific pedagogical interaction. In particular, the TBG framework does not dissociate between gestures, verbal utterances and teaching behaviors. Instead, it considers each of these elements as providing information and clues on how teachers self-organize in their pedagogical environments. Possible questions that can be answered through the TBG framework on autopoiesis include: how do teachers adapt their teaching depending upon students' specific circumstances or learning needs? What differences in teaching can be observed between novice and expert teachers? To what extent are there, for example, gender-based differences in gestural teaching styles?

Sense-making relates to how individuals disclose the various meanings they have of their worlds. These meanings are informed by the interactions they have with their environment, and by self-regulative and relational processes (van der Schyff, 2019). The TBG framework allows for considerations on how teachers disclose their worlds of meaning and how interactions in the pedagogical environment inform these meanings. Once observational analysis takes place, and verbal, musical and gestural elements are annotated, it is possible to combine these elements. Here researchers can establish connections between what teachers value during the teaching process, and how gestural and verbal elements cohere with teachers' verbal statements and actions across different contexts (and, even, cultures). This can yield insights into the complexities of teaching identities and how they may evolve across time—potentially through longitudinal research.

Autonomy refers to the fact that individuals continuously engage in the construction of their world and life, and that although meanings derive from interactions between individuals, their environment and others, meanings are not externally imposed. Instead, they emerge from unique histories of negotiation between their own agency and interaction between people and their environments (Di Paolo, 2005). Interestingly, in this regards, van der Schyff (2019) proposes that living cognition is fundamentally improvisational as a result of individual autonomy in the process. In agreement with this proposition, I have argued elsewhere that the vocal and instrumental music teaching and learning context consists of interactive discursive experiences of action and movement, through which meaning is constructed in a shared process. Furthermore, such a shared process is a creative act for both teacher and student, and it involves reciprocal cooperation and spontaneous motivation enveloped by gestural, verbal and musical behaviors (Simones, 2015). Using the TBG framework to study autonomy requires observation of teaching and learning interactions, via video recordings. Although the framework as it stands at this point in time is unable to document the interaction in itself, the data obtained is generated through the interactions established, thus allowing for documenting unique histories of interaction, from teachers' perspectives.

It should be noted that these concepts of autopoiesis, sense-making, and autonomy describe the self-generative and adaptive processes exhibited by even very simple living systems-the most basic forms of cognition as adaptive, perceptually-guided action whereby an organism actively shapes survival and its relevant relationships with the environment. Thinkers associated with enactivism explore the continuity between such life processes and more complex instantiations of mind, such as those involved in language, social cognition, and learning. In line with this, the enactivism concept of 'participatory sense-making' is also useful in thinking about the role of gesture in student teacher interactions (see De Jaegher et al., 2016). This is the case as in vocal and instrumental music teaching and learning, co-creation of meaningful action occurs at all stages of the process. Learning and teaching in these contexts is therefore necessarily dependent and fully embedded on both action and co-creation. The TBG framework can help shed a light on the meaningfulness attached in the process from a point of view the meaningfulness of communication and musical co-creation involved in teaching and learning.

CONCLUSION

The TBG framework expands and integrates theoretical frameworks from various disciplines such as gesture-led research, psycholinguistics, observational and motor learning, and music psychology and education. While doing so, it offers an approach in which these frameworks effectively work together to provide insights on the meaningfulness of instrumental and vocal teachers' gestures, both in terms of

scaffolding approaches used to support students in their learning and also in terms of pedagogical practices. More specifically, application of this framework can enhance understandings of how communication (verbal, gestural, and musical) is established between teachers and students, and indeed of what may be required from a teaching and learning effectiveness perspective. Given that the normative teaching and learning interactions consist of complex interactive and improvised discursive experiences of action and movement—experiences through which meaning is constructed, this framework is applicable both when teaching specific repertoire, or whenever creating and improvising collaboratively with students. Although the data obtained is qualitative, it is also possible to quantify frequencies of certain variables, and to use quantitative methods for establishing relationships between variables (examples of how this has been done include Simones et al., 2015a,b). In addition, the framework can be used as a self-reflection tool by vocal and instrumental music teachers interested in learning more about how they teach; and it can be used in both higher, further education and continuous professional development teacher training courses as a platform for enhancing professional discussions between aspiring, novices, teaching experts and mentors.

With regards limitations, the framework presented here is focused on studying how teachers teach and is of limited application for establishing considerations on students' learning. For considering students' gestures and their learning behaviors, students' learning behaviors could be taken as a context-dependant basis for their gestures. However, further considerations on the use of this approach require further observation, testing, and review. So far the TBG framework was tested in a piano pedagogical context only, and further considerations on the usability of this framework in other instrumental and vocal teaching and learning contexts require further testing. When applying this framework to other vocal and instrumental music teaching contexts, there is a possibility that other teaching behaviors and gesture categories might need to be added, in accordance to further contextual specificities.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by School of Creative Arts Research Ethics Committee. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

FUNDING

Studies that enabled conceptualization of this framework were supported by a Ph.D. studentship provided by the Department for Employment and Learning, administered by Queens University Belfast, Northern Ireland.

ACKNOWLEDGMENTS

The author wishes to express her gratitude to the research participants in previous studies for their vital contribution in making possible the conceptualization of the proposed framework and the reviewers and editors for their insightful and valuable comments. Parts of the literature review included ideas generated during the author's Ph.D. work (published online), which were here further developed and expanded.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2019.00141/full#supplementary-material

REFERENCES

Abrahamson, D., and Sánchez– García, R. (2014). "Learning is moving in new ways: an ecological dynamics view on learning across the disciplines," in *Paper Presented at the Conference Embodied Cognition in Education* (Utrecht: University of Utrecht).

Adachi, M. (1994). The role of the adult in the child's early musical socialization: a Vygotskian perspective. *Quarterly* 5, 26–35.

Amsel, E., and Byrnes, J. P. (2002). "Preface," in *Language, Literacy, and Cognitive Development: The Development and Consequences of Symbolic Communication,* eds E. Amsel and J. P. Byrnes (Mahwah, NJ: Taylor & Francis), 7–11. doi: 10.4324/9781410601452

Bailey, B. (2007). Chorus: movement in the choral rehearsal. *Teach. Music* 14, 22–26.

Bakeman, R., and Gottman, J. (1986). *Observing Interaction: An Introduction to Sequential Analysis*. Cambridge: Cambridge University Press.

Barrett, M. (2005). "Musical communication and children's communities of musical practice," in *Musical Communication*, eds D. Miell, R. MacDonald, and D. J. Hargreaves (Oxford: Oxford University Press), 261–280. doi: 10.1093/acprof:oso/9780198529361.003.0012

Biasutti, M., and Concina, E. (2018). The effective music teacher: the influence of personal, social, and cognitive dimensions on music teacher self-efficacy. *Music. Sci.* 22, 264–279. doi: 10.1177/1029864916685929

Boyes Braem, P., and Braem, T. (2000). "A pilot study of the expressive gestures used by classical orchestra conductors," in *The Signs of Language Revisited*, eds K. Emmorey and H. Lane (Mahwah, NJ: Lawrence Elrbaum associates), 143–165.

Broadbent, D. (1958). *Perception and Communication.* London: Pergamon Press, 143–165.

Bruner, J. (1966). *Towards a Theory of Instruction*. Cambridge, MA: Cambridge University Press.

Carlin, K. (1997). *Piano pedagogue perception of teaching effectiveness in the preadolescent elementary level applied piano lesson as a function of teacher behavior* (Unpublished doctoral dissertation). Indiana University, Bloomington, IN, United States.

Cassell, J. (1998). "A framework for gesture generation and interpretation," in *Computer Vvsion in Human-Machine Interaction*, ed R. Cippolla (Cambridge: Cambridge University Press), 248–265.

Chagnon, R. (2001). *A comparison of five choral directors' use of movement to facilitate learning in rehearsals* (Unpublished D.M.A. dissertation). Arizona State University, Tempe, AZ, United States.

Clayton, M. (2005). "Communication in Indian raga performance," in *Musical Communication*, eds D. Miell, R. McDonald, and D. Hargreaves (Oxford: Oxford University Press), 361–381. doi: 10.1093/acprof:oso/9780198529361.003.0017

Cohen, V. (1997). Explorations of kinaesthetic analogues for musical schemes. *Bull. Counc. Res. Music Educ.* 131, 1–14.

Cook, S. W., Duffy, R. G., and Fenn, K. M. (2013). Consolidation and transfer of learning after observing hand gesture. *Child Dev.* 84, 1863–1871. doi: 10.1111/cdev.12097

Cook, S. W., and Goldin-Meadow, S. (2006). The role of gesture in learning: do children use their hands to change their minds? *J. Cogn. Dev.* 7, 211–232. doi: 10.1207/s15327647jcd0702_4

Cook, S. W., Mitchell, Z., and Goldin-Meadow, S. (2008). Gesturing makes learning last. *Cognition* 106, 1047–1058. doi: 10.1016/j.cognition.2007.04.010

Cook, S. W., Yip, T. K., and Goldin-Meadow, S. (2010). Gesturing makes memories that last. *J. Mem. Lang.* 63, 465–475. doi: 10.1016/j.jml.2010.07.002

Crosby, A. (2008). Dalcroze's Eurthymic techniques for choral rehearsal: moving to "O Magnum Mysterium." *Choral J.* 48, 30–41.

Curwen, J. (1858). *Standard Course of Lessons on the Tonic Sol-fa Method of Teaching to Sing*. London: The Tonic Sol-fa Reporter and Magazine of Vocal Music for the People.

Dahl, S., and Friberg, A. (2007). Visual perception of expressiveness in musicians body movements. *Music Percept.* 24, 433–454. doi: 10.1525/mp.2007.24.5.433

Davidson, J. (1994). What type of information is conveyed in the body movements of solo musician performers? *J. Hum. Movement Stud.* 6, 279–301.

Davidson, J. (2001). The role of the body in the production and perception of solo vocal performance: A case study of Annie Lennox. *Musicae Scientiae* 5, 235–256. doi: 10.1177/102986490100500206

Davidson, J. (2005). "Bodily communication in musical performance," in *Musical Communication*, eds D. Miell, R. McDonald, and D. Hargreaves (Oxford: Oxford University Press), 215–237. doi: 10.1093/acprof:oso/9780198529361.003.0010

Davidson, J., and Correia, J. (2002). "Body movement in performance," in *The Science and Psychology of Music Performance: Creative Strategies for Teaching and Learning*, eds R. Parncutt and G. McPherson (Oxford: Oxford University Press), 237–250. doi: 10.1093/acprof:oso/9780195138108.003.0015

Davidson, J. W. (2012). Bodily movement and facial actions in expressive musical performance by solo and duo instrumentalists: two distinctive case studies. *Psychol. Music* 40, 595–633. doi: 10.1177/0305735612449896

De Jaegher, H., Peräkylä A., and Stevanovic, M. (2016). The co-creation of meaningful action: bridging enaction and interactional sociology. *Philos. T. R. Soc. B* 371:20150378. doi: 10.1098/rstb.2015.0378

Di Paolo, E. A. (2005). Autopoiesis, adaptivity, teology, agency. *Phenomenol. Cogn. Sci.* 4, 97–125. doi: 10.1007/s11097-005-9002-y

Donald, M. (2001). *A Mind so Rare. The Evolution of Human Consciousness.* New York, NY: Norton.

Dunbar-Hall, P. (2006). An investigation of strategies developed by music learners in a cross-cultural setting. *Res. Stud. Music Educ.* 26, 63–70. doi: 10.1177/1321103X060260010201

Ericsson, K., and Lehmann, A. (1996). Expert and exceptional performance: evidence of maximal adaptation to task constraints. *Annu. Rev. Psychol.* 47, 273–305. doi: 10.1146/annurev.psych.47.1.273

Gallagher, S. (2005). *How the Body Shapes The Mind*. Oxford: Oxford University Press. doi: 10.1093/0199271941.001.0001

Gholson, S. A. (1998). Proximal positioning: a strategy of practice in violin pedagogy. *J. Res. Music Educ.* 46, 535–545. doi: 10.2307/3345349

Gibson, J. (1966). *The Senses Considered as Perceptual Systems*. Boston, MA: Hughton Mifflin.

Gibson, J. (1977). "The theory of affordances," in *Perceiving, Acting, and Knowing: Toward an Ecological Psychology*, eds R. Shaw, and J. Bransford (Hillsdale, NJ: Lawrence Erlbaum), 67–82.

Gipson, R. (1978). *An observational analysis of wind instrument private lessons*. Dissertation Abstracts International (AAT 7818757).

Goldin-Meadow, S. (2003). "Thought before language: do we think ergative?" in *Language in Mind*, eds D. Gentner and S. Goldin-Meadow (Cambridge, MA: MIT Press), 493–522.

Gritten, A., and King, E. (2011). *Introduction*, eds A. Gritten and E. King. Farnham: Ashgate.

Gross, L. P. (1974). "Modes of communication and the acquisition of symbolic competence," in *Media and Symbols: The Forms of Expression, Communication, and Education*, eds D. R. Olson (Chicago, IL: University of Chicago Press), 56–80.

Hatten, R. (2006). *A Theory of Musical Gesture and Its Application to Beethoven and Schubert*. Bloomington, IN: Indiana University Press.

Hepler, L. E. (1986). *The Measurement of teacher-student interaction in private music lessons and its relation to teacher field dependence/field independence*. Dissertation Abstracts International (AAT 8627848).

Hibbard, T. T. (1994). *The Use of Movement as an Instructional Technique in Choral Rehearsals* (Unpublished doctoral dissertation). University of Oregon, Eugene, OR, United States.

Jaques-Dalcroze, E. (1921/1967). *Rhythm, Music and Education*. London; Whitstable: The Riverside Press Ltd.

Jensenius, A. R., Wanderley, M. M., Godøy, R. I., and Leman, M. (2010). "Musical gestures, concepts and methods in research," in *Musical Gestures, Sound, Movement and Meaning*, eds R. Godøy and M. Leman (New York, NY: Routledge), 12–35.

Kendon, A. (1980). "Gesticulation and speech: two aspects of the process of utterance," in *The Relation Between Verbal and Nonverbal Communication*, ed M. R. Key (The Hague: Mouton), 207–227.

Kennell, R. (2002). "Systematic research in studio instruction in music," in *The New Handbook of Research on Music Teaching and Learning*, eds R. Colwell and C. Richardson (New York, NY: Oxford University Press), 243–256.

Kodály, Z. (1965). *Let us Sing Correctly*. London: Boosey & Hawkes.

Krueger, J. (2014). Affordances and the musically extended mind. *Front. Psychol.* 4:1003. doi: 10.3389/fpsyg.2013.01003

Kurkul, W. (2007). Nonverbal communication in one-to-one music performance instruction. *Psychol. Music* 35, 327–362. doi: 10.1177/0305735607070385

Lausberg, H., and Sloetjes, H. (2009). Coding gestural behavior with the Neuroges-Elan System. *Behav. Res. Methods Instrum. Comput.* 41, 841–849. doi: 10.3758/BRM.41.3.841

Lave, J., and Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press. doi: 10.1017/CBO9780511815355

Leman, M., and Godøy, R. (eds.). (2010). "Why study musical gestures?" in *Musical Gestures, Sound, Movement, and Meaning* (New York, NY: Routledge), 3–11.

Levasseur, S. (1984). *Nonverbal communication in the applied voice studio*. Dissertation Abstracts International (AAT 9432541).

Malafouris, L. (2013). *How Things Shape the Mind: A Theory of Material Engagement*. Cambridge, MA: The MIT Press. doi: 10.7551/mitpress/9476.001.0001

McDonald, R., Hargreaves, D., and Miell, D. (eds.). (2002). *Musical Identities*. Oxford: Oxford University Press.

McNeill, D. (1985). So you think gestures are nonverbal? *Psychol. Rev.* 92, 350–371. doi: 10.1037//0033-295X.92.3.350

McNeill, D. (1992). *Hand and Mind, What Gestures Reveal About Thought*. Chicago, IL: University of Chicago Press.

McNeill, D. (2005). *Gesture and Thought*. Chicago, IL: University of Chicago Press. doi: 10.7208/chicago/9780226514642.001.0001

Merleau-Ponty, M. (1945). *Phenomenologie de la Perception*. Paris: Gallimard.

Nafisi, J. (2013). *Gesture and body-movement as teaching and learning tools in western classical singing* (Unpublished doctoral dissertation). Monash University, Melbourne, VIC.

Nathan, M. J., and Alibali, M. W. (2011). "How gesture use enables intersubjectivity in the classroom," in *Integrating Gestures: The Interdisciplinary Nature of Gesture*, eds G. Stam and M. Ishino (Amsterdam: John Benjamins), 257–276. doi: 10.1075/gs.4.23nat

Neisser, U. (1967). *Cognitive Psychology*. New York, NY: Appleton-Century-Crofts.

Orff, C., and Keetman, G. (1950) *Musik für Kinder I*. Mainz: Schott.

Overy, K., and Molnar-Szakacs, I. (2009). Being together in time: musical experience and the mirror neuron system. *Music Percept.* 26, 489–504. doi: 10.1525/mp.2009.26.5.489

Pearson, A. (2016). *Gesture in Karnatak Music: Pedagogy and Musical Structure in South India* (Durham theses). Available online at: http://etheses.dur.ac.uk/11782/

Philpott, C. (2001). "The body and musical literacy," in *Issues in Music Teaching*, eds C. Philpott and C. Plummeridge (London: Routledge Falmer), 79–91.

Piaget, J. (1970). *Main Trends in Psychology*. London: George Allen & Unwin.

Poggi, I. (2007). *Mind, Hands, Face and Body. A Goal And Belief View of Multimodal Communication*. Berlin: Weidler.

Poggi, I. (2011). "Music and leadership, the choir conductor's multimodal communication," in *Integrating Gestures*, eds G. Stam, and M. Ishino (Amsterdam: John Benjamins), 341–353. doi: 10.1075/gs.4.31pog

Rahaim, M. (2008). Gesture and melody in Indian vocal music. *Gesture* 8, 325–347. doi: 10.1075/gest.8.3.04rah

Rahaim, M. (2012). *Gesture and Voice in Hindustani Music, Musicking Bodies*. Middletown, CT: Wesleyan University Press.

Rodger, M. W. M., Craig, C. M., and O'Modhrain, S. (2012). Expertise is perceived from both sound and body movement in musical performance. *Hum. Mov. Sci.* 31, 1137–1150. doi: 10.1016/j.humov.2012.02.012

Rosenthal, R. K. (1984). The relative effects of guided model, model only, guide only, and practice only treatments on the accuracy of advanced instrumentalists' practice. *J. Res. Music Educ.* 32, 265–273. doi: 10.2307/3344924

Salomon, G. (1993). *Distributed Cognitions*. Cambridge, MA: Cambridge University Press.

Sassenberg, U. (2011). *Thinking hands: how co-speech gestures reflect cognitive processes* (Unpublished doctoral dissertation). Humboldt University, Berlin, Germany.

Saxe, G. (1979). "Children's counting: the early formation of numerical symbols," in *Early Symbolization. New Directions for Child Development*, eds D. Wolf and H. Gardner (San Francisco, CA: Jossey-Bass), 78–84. doi: 10.1002/cd.23219790308

Saxe, G. B., Gerhart, M., and Guberman, S. B. (1984). "The social organization of early development," in *Children's Learning in the "Zone of Proximal Development"* eds B. Rogoff and J. V. Wertsch (San Francisco, CA: Jossey-Bass), 19–30 doi: 10.1002/cd.23219842304

Schiavio, A., Biasutti, M., van der Schyff, D., and Parncutt, R. (2018). A matter of presence. A qualitative study on teaching individual and collective music classes. *Music. Sci.* doi: 10.1177/1029864918808833. [Epub ahead of print].

Schiavio, A., van der Schyff, D., Biasutti, M., Moran, N., and Parncutt, R. (2019). Instrumental technique, expressivity, and communication. A qualitative study on learning music in individual and collective settings. *Front. Psychol.* 10:737. doi: 10.3389/fpsyg.2019.00737

Schirato, T., and Yell, S. (2000). *Communication and Culture*. St Leonard, NSW: Allen and Unwin.

Seitz, J. A. (2005). Dalcroze, the body, movement and musicality. *Psychol. Music.* 33, 419–435. doi: 10.1177/0305735605056155

Simones, L. (2015). *The roles of gesture in piano teaching and learning* (Doctoral dissertation). Queen's University, Belfast, United Kingdom. Available online at: https://pure.qub.ac.uk/portal/files/182873198/The_roles_of_gesture_in_piano_teaching_and_learning_PhD_thesis_delivered.pdf

Simones, L. (2019). A framework for studying teachers' hand gestures in instrumental and vocal music contexts. *Music. Sci.* 23, 231–249. doi: 10.1177/1029864917743089

Simones, L., Rodger, M., and Schroeder, F. (2015a). Communicating musical knowledge through gesture: Piano teachers gestural behaviours across different levels of student proficiency. *Psychol. Music* 43, 723–735. doi: 10.1177/0305735614535830

Simones, L., Rodger, M., and Schroeder, F. (2017). Seeing how it sounds: observation, imitation, and improved learning in piano playing. *Cogn. Instruc.* 35, 125–140. doi: 10.1080/07370008.2017.1282483

Simones, L., Schroeder, F., and Rodger, M. (2015b). Categorizations of physical gesture in piano teaching: a preliminary enquiry. *Psychol. Music* 43, 103–121. doi: 10.1177/0305735613498918

Thompson, E. (2007). *Mind in Life: Biology, Phenomenology and the Sciences of Mind*. Cambridge, MA: Harvard University Press.

Thompson, M. (2005). *Senior Project in Music Technology Towards a Gestural Analysis of Piano Performance*. Cambridge, MA: Harvard University Press.

Tomasello, M., Carpenter, M., Call, J., Behne, T., A., and Moll, H. (2005). Understanding and sharing intentions: the origins of cultural cognition. *Behav. Brain Sci.* 28, 675–735. doi: 10.1017/S0140525X05000129

van der Schyff, D. (2017). Refining the model for emotion research: a 4E perspective. *Construct. Found.* 12, 227–229.

van der Schyff, D. (2019). "Improvisation, enaction, and self-assessment," in *The Oxford Handbook of Philosophical and Qualitative Assessment in Music Education*, eds D. J. Elliott, M. Silverman & G. McPherson (New York, NY: Oxford University Press), 319–345.

Varela, F. J., Thompson, E., and Rosch, E. (1991). "The embodied mind: cognitive science and human experience," in *Performance Gestures of Musicians: What Structural and Emotional Information Do They Convey?* eds A. Camurri and G. Volpe (Berlin; Heidelberg: Springer), 468–478. doi: 10.1093/oxfordhb/9780190265182.013.15

Vilar, L., Araújo, D., Davids, K., and Renshaw, I. (2012). The need for "representative task design" in evaluating efficacy of sk ills tests in sport: a comment on Russell, Benton and Kingsley (2010). *J. Sports Sci.* 30, 1727–30. doi: 10.1080/02640414.2012.679674

Vygotsky, L. (1966). "Genesis of the higher mental functions (abridged translation)," in *Learning to Think*, eds M. Light, P., Sheldon, S., and Woodhead (London: Routledge and Open University Press), 32–41.

Vygotsky, L. (1978). *Mind and Society*. Cambridge: Harvard University Press.

Vygotsky, L. (1986). *Thought and Language*, ed A. Kozulin. Cambridge: MIT Press.

Vygotsky, L. S. (1981). "The genesis of higher mental functions," in *The Concept of Activity in Soviet Psychology*, ed J. V. Wertsch (Armonk, NY: M.E. Sharpe), 144–188.

Wanderley, M., and Vines, B. (2006). "Origins and functions of clarinetists ancillary gestures," in *Music and Gesture*, eds A. Gritten and E. King (Farnham: Ashgate), 165–191.

Wertsch, J. V., McNamee, G. D., Gillian, D., McLane, J. B., and Budwig, N. A. (1980). The adult-child dyad as a problem-solving system. *Child Dev.* 51, 1215–1221. doi: 10.2307/1129563

Winold, H., and Thelen, E. (1994). Coordination and control in the bow arm movements of highly skilled cellists. *Ecol. Psychol.* 6, 1–31. doi: 10.1207/s15326969eco0601_1

Wis, R. M. (1993). *Gesture and body movement as physical metaphor to facilitate learning and to enhance musical experience in the choral rehearsal* (Unpublished doctoral dissertation). Northwestern University, Evanston, IL, United States.

Wöllner, C. (2008). Which part of the conductor's body conveys most expressive information? A spatial occlusion approach. *Music. Sci.* 12, 249–272. doi: 10.1177/102986490801200204

Wood, D. J., Bruner, J. S., and Ross, G. (1976). The role of tutoring in problem solving. *J. Child Psychol. Psychiatry* 17, 89–100. doi: 10.1111/j.1469-7610.1976.tb00381.x

Young, S. (2005). "Musical communication between adults and young children," in *Musical Communication*, eds D. Miell, D., McDonald, R., Hargreaves (Oxford: Oxford University Press), 281–299. doi: 10.1093/acprof:oso/9780198529361.003.0013

Zhukov, K. (2004). *Teaching styles and student behaviour in instrumental music lessons in Australian Conservatoriums* (Unpublished doctoral dissertation). University of New South Wales, Sydney, NSW, Autralia.

Zlatev, J. (2008). "The co-evolution of intersubjectivity and bodily mimesis," in *The Shared Mind: Perspectives on Intersubjectivity*, eds J. Zlatev, T. P. Racine, C. Sinha, and E. Itkonen (Amsterdam; Philadelphia, PA: Benjamins), 215–244. doi: 10.1075/celcr.12.13zla

Zlatev, J., Persson, T., and Gärdenfors, P. (2005). Triadic bodily mimesis is the difference. Commentary to Tomasello et al. (2005). *Behav. Brain Sci.* 28, 675–735. doi: 10.1017/S0140525X05530127

Zorzal, R., and Lorenzo, O. (2019). Teacher–student physical contact as an approach for teaching guitar in the master class context. *Psychol. Music* 47, 69–82. doi: 10.1177/0305735617737154

Conflict of Interest: The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.