

From intra-action to intratwining? Language learning as an embodied activity in and through music education

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In this article, we argue that transdisciplinary research and pedagogical practice on music and language learning should find new conceptual and practical approaches to examine the different ways of integrating music and language education. We aim to strengthen transdisciplinary research and practice related to language learning as an embodied activity in and through music education by focusing on the notion of intra-action, which is seen as a central notion of new materialist theories related to the rapidly growing field of embodied language learning. Conceptually, we contest the ways music and language learning have been understood in pertinent research, which often stems from mere multidisciplinary thinking instead of a deeply transdisciplinary ethos. Dismantling the boundaries between the disciplines of music education and applied linguistics in an embodied language learning context towards transdisciplinary thinking, we introduce intratwining as an example of transdisciplinary theorisation (coordinating the notions of intra-action and intertwining). In addition, we call attention to the use of music-integrated language learning, which could also be approached from the perspective of language-integrated music learning, on which this study grounds its transdisciplinary lens.

Keywords: embodiment, intra-action, music education, language learning, transdisciplinarity

1 Introduction

In transdisciplinary research, which seeks to value different disciplines equally, it is difficult to find conceptualisations that could move beyond the boundaries and constraints arising from different theoretical orientations in various disciplines (Hirsch Hadorn et al., 2008). It is already challenging, even within a single discipline, to reference studies with different theoretical approaches and frameworks due to their diverse conceptual understandings. In transdisciplinary research, conceptual alignment becomes even more complex because studies in various disciplines can largely draw on different research paradigms.

In this article, we suggest that new transdisciplinary conceptual approaches are needed to strengthen the integration of music and language education. The current state of this field seems to emphasise multidisciplinary instead of

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transdisciplinary thinking, resulting in intellectual and scientific developments that lack holistic integration of understanding, meaning-making and scientific explanations. To meet the essence of transdisciplinary ethos (Augsburg, 2014), the field needs to take action towards more equal, reciprocal, and non-hierarchical ways of creating new activities which highlight “real-world phenomena existing within tangible time and space” (Mård & Harnow Klausen, 2023, p. 15) rather than traditional disciplinary orientations (see also Bradley & Harvey, 2019; Halliday, 2001; Hult, 2010). By building a conceptual assemblage, we move beyond disciplinary pluralism (cf. Pöyhönen, 2013) and demonstrate how different research paradigms may strengthen transdisciplinary research and practice when exploring the integration of music and language learning. The perspective of transdisciplinary research in the conceptual exploration of this study refers to embodied (holistic) language learning in and through music and musical activity. More specifically, this article is centred on the concept of embodiment, particularly through the examination of the notions of *intra-action* (Barad, 2007) and *holistic (aesthetic) experience* (Dewey, 1963, see also 1916, MW 9, p. 254). As a methodological starting point, we have identified the nature and extent of previous scholarship, including ongoing research, concerning these key concepts under investigation. We have focused on examining key characteristics of a concept and clarifying the approaches of research in a given field (e.g., Munn et al., 2018). By conceptual coordination, we refer to disciplinary dialogue through the examination of different dimensions of the key concepts (e.g., embodiment, holistic experience, intra-action). Following Pöyhönen’s (2013) thinking, our purpose is to provoke discussion on “how to connect the different ways of conceptualizing the phenomenon” (p. 2). Our understanding of the conceptual coordination as a starting point also aligns with Jantsch’s (1972) original coinage of ‘transdisciplinarity’ as “the co-ordination of all disciplines and interdisciplines in the education/innovation system on the basis of a generalized axiomatics (introduced from the purposive level) and an emerging epistemological (“synepistemic”) pattern”¹ (p. 106).

Accordingly, a recent literature review (Jusslin et al., 2022) on embodied approaches to language learning shows that studies integrating music into language learning have not explicitly used the embodied framework as their theoretical or conceptual lens. Hence, the review did not include any studies related to music and language integration. Why the perspective of embodiment is important for this particular field of research and practice is evidenced by increasing attention on embodied learning as a concept in the field of educational sciences in general (e.g., Hegna & Ørbæk, 2021; Kraus & Wulf, 2022; Stolz, 2022). This interest and increase in such research is based on the embodied turn in educational and social sciences that emphasises the interconnectedness of the body-mind that departs from the traditional Cartesian conception of humans (e.g., Lakoff & Johnson, 1999; Merleau-Ponty, 2013; Shapiro, 2010). Further, in contrast to the long cognitivist tradition in linguistics (e.g., Atkinson, 2010), the approach of embodied learning is being expanded within applied linguistics as a novel and innovative conceptualisation (e.g., Jusslin et al., 2022). Such a starting point is different from what arts education, including music, has been considering as their ‘daily bread’ for decades (e.g., Juntunen, 2023). An extensive research tradition

¹ Synepistemic points to a new “entity” that transcends the related disciplines without replacing them.

exists on embodiment-centred music educational practices (e.g., Juntunen & Hyvönen, 2004; Juntunen & Westerlund, 2001; Sutela, 2020; Sutela et al., 2021). This integral role of embodiment in music educational practices (e.g., singing and playing an instrument) refers, for example, to the key aim of pedagogical practices to strengthen students' embodied presence and body-mind connection in educational situations (Juntunen, 2023).

The context for this study—the interface between linguistics and music education from a transdisciplinary point of view—is relatively new (Lehtinen-Schnabel, 2023). Therefore, it is worth noting that the historical roots of the approaches towards embodied learning are different in the disciplines of applied linguistics and music education. Recent research in applied linguistics engages in the discussion around posthumanist and new materialist (cf. post-foundational, Mazzei & Jackson, 2023) theories and conceptualisations of embodiment. In mainstream music education research, there is still a leaning towards phenomenological approaches and pragmatism, and only a limited number of music education studies thus far draw from post-foundational perspectives (e.g., Crickmay & Keene, 2022; Kinsella et al., 2022; Kvile & Christophersen, 2023). However, pragmatism as associated with cultural naturalism shares points of departure with post-philosophies that provide a new and interesting phase “within the larger-scale effort of dealing with the consequences of modernity” (Väkevä, 2023, p. x). In this historical disciplinary context, our purpose is to overcome some of the hindrances to transdisciplinary knowledge production and scientific development in this emerging field, where research traditions meet and hopefully entangle in a non-hierarchical, dynamic way.

Our roles as music education practitioners and researchers² focused on transdisciplinary approaches to integrating music and language, and the intersections between educational, social, and wellbeing-related practices have led us to conduct this conceptual analysis. Our work in diverse transdisciplinary settings and our sometimes ambiguous experiences between qualitative and post-qualitative perspectives have sparked our interest in considering some related key concepts (cf. embodiment, holistic experience, and intra-action) from a transdisciplinary point of view. To this end, we strive to understand how these concepts are being used in different research paradigms and how to find transdisciplinary ground in addressing embodied approaches to language learning. To advance transdisciplinary understanding, we believe that a comprehensive understanding of the phenomena under study calls for conceptual alignments of theoretical contributions from a variety of disciplinary perspectives.

In summary, the purpose of this study is to explore different ways of conceptualising the transdisciplinary phenomenon of embodied language learning in and through music education. This conceptual study's research

² The first author as a practitioner-researcher (choir conductor/researcher) explores Learn-Finnish-by-Singing choirs in which the emerging choir practice is co-constructed in transdisciplinary and intercultural collaboration with the choir conductor, L2 teacher and adult choir participants with culturally and linguistically diverse backgrounds. She is also a member of the transdisciplinary research group ELLA (Embodied Language Learning through the Arts). The second author oversees the Creativity and Arts in Social and Health Fields master's degree program at the Helsinki Metropolia University of Applied Sciences, which is centred around transdisciplinary ethos and goals. She has also been researching and developing music education practices in the intersections of disability and legal studies.

question is: How can transdisciplinary research and pedagogical practice on integrating music and language education be strengthened through conceptual coordination?

2 Drawing together conceptual resources for transdisciplinary research

In alignment with other arts-integrated activities, we see embodiment as a central concept for this study because when looking at language learning through music and musical activity, embodiment is holistically entangled with the process of learning (e.g., Cannon, 2017; Hanks & Eckstein, 2019; Haught & McCafferty, 2008; Korpinen & Anttila, 2022, 2023; Scally, 2019). According to Jusslin et al. (2022), “embodied learning can be broadly defined as a conception of learning where learners are holistically engaged and intertwined in their social and material surroundings” (p. 2; see also Anttila, 2018; Anttila & Svendler Nielsen, 2019). More broadly, the embodied turn in humanities stems from the fields of phenomenology (Merleau-Ponty, 2013) and cognitive sciences (Lakoff & Johnson, 1999; Shapiro, 2010); however, embodied perspectives have been approached diversely in different disciplines. In what follows, by using the methods of analysis and synthesis, a variety of embodiment definitions are reviewed from the standpoints of the two major disciplines involved in this research, namely, applied linguistics and music education. Expanding on Pöyhönen’s (2013) notion that “it is reasonable to be suspicious of the idea of all scientific concepts functioning in the same way” (p. 5), we work towards critical conceptual coordination when researching language learning as an embodied activity in and through music education.

The embodied music educational approach in many studies emphasises the agentic nature of embodiment as a phenomenon (regardless of how internal and deep the processes may be) which refers to the capacity one has in a given context (e.g., Sutela, 2020; see also Campbell, Meynell & Sherwin, 2009). The perspective of agency is equal to the educators’ responsibility of nurturing embodied experiencing and supporting students’ rootedness in their embodiment in educational situations. Such an approach is grounded in the ontological premise of phenomenology, through which subjectivity is, in fact, intersubjective (that is, it never exists in isolation but with other beings) (Sutela, 2020). Accordingly, following Merleau-Ponty’s (2013) definition, we find no separation between the mental and physical in embodied educational practice: “The world is not what I think, but what I live” (p. lxxx). Phenomenological traditions examine the link between embodiment and action (Husserl, 1998; Merleau-Ponty, 2013) but emphasise the internal processes of the actor, ranging from meaning-making to pre-reflective ways of being and acting. The activity perspective that has been applied in studies across contexts of general and specialised education in music does not exclude the internal embodied processes of an individual (e.g., Juntunen, 2023).

By contrast, music education studies stemming from the tradition of pragmatism (e.g., Dewey) look at the embodied perspective from the lens of holistic (aesthetic) experience. Embodiment in the pragmatist tradition refers to inescapable embodied interactions with the environment (Dewey 1963; Väkevä, 2004; Westerlund & Juntunen, 2005). In Deweyan pragmatism, “the outer embodiment and inner process become inseparable” (Reimer, 1989, p. 35). Westerlund (2002) indicated that in Deweyan thinking, an individual’s embodied

experience does not entirely stream from the inner self but in relation to habitual ways of feeling and symbolising as well as situation and environment. They further stated that “embodiment in a musical context means individual involvement and transaction with the world so that an individual is not taking music as something that has to fit one’s mind” (Westerlund, 2002, pp. 164–165) but instead interlinks musical actions with their social and material surroundings in and through the sounds they are making. Westerlund (2002) also posited that music-making can be *disembodied* if the musician or student does not practise bodily awareness situationally; this does not necessarily refer to active or agentic music-making; rather, the musician’s internal processes are equally essential and embodied, but they rely on bodily awareness.

In both phenomenological and pragmatist research traditions of music education, embodiment of human beings is central and holistically connected with their social surroundings. The holistic nature of experience in the sense of Deweyan pragmatism also emphasises embodiment as entangled with a material environment from which it cannot be separated (e.g., Westerlund & Juntunen, 2005). This inseparability of humans and non-humans is also underlined in post-qualitative approaches to embodiment, although from different ontological perspective, as well as, for instance, in cognitive psychology, which addresses the 4E perspective, the integral interconnection of body, different modalities, and social and physical environments (Barsalou, 2020). The perspective of 4Es denotes cognition, affect, and behaviour *emerging* from the body’s *embedding* within environments that *extend* cognition, while agents *enact* situated actions that reflect their current cognitive and affective states (Barsalou, 2020).

Research on embodied approaches in language education has broadly drawn on different theoretical perspectives/paradigms to contribute to ongoing trends. The notion of embodied learning arrived in language education through scholars who began to view learning as an embodied process (e.g., Atkinson, 2010; Macedonia, 2019), challenging the dominant cognitivist orientation in the field (Atkinson, 2010). Although various bodily approaches supporting language learning in different educational contexts have been deployed as early as the 1960s (e.g., *Total Physical Response approach*, Asher, 1969), pedagogical practices emphasising embodied learning have only gradually made their way into the realm of language classrooms (e.g., Macedonia, 2019; Macrine & Fugate, 2021). The number of empirical studies on embodied language learning has, however, increased rapidly since the late 2010s (Jusslin et al., 2022), indicating a growing interest in implementing and developing related approaches in practice not only within the settings of language education but also in new transdisciplinary learning environments (e.g., arts-based contexts).

Recent innovative studies, particularly in applied linguistics (e.g., Pennycook, 2018; Thorne et al., 2021; Toohey, 2019), have also been, to an increasing extent³, based on posthumanist and new materialist perspectives. Overall, these perspectives aim to provide new ways of thinking – also related to embodied learning – by reconsidering the ontological, epistemological, and ethical premises (Bozalek & Zembylas, 2018), by challenging the dominant position of humans (Pennycook, 2018) in the more-than-human world, and by underlining “the material nature of humans, discourses, machines, other objects, other species, and the natural environment” (Toohey, 2019, p. 938). In other words, these

³ See special issue of the Canadian Modern Language Review vol. 77, no 4. (2021) <https://www.utpjournals.press/toc/cmlr/77/4>

perspectives indicate that the world happens in a complex, changing and dynamic interrelationship between different materialities instead of placing the emphasis on humans and representation through language (e.g., Pennycook, 2018). In these materialities, the embodied perspective is ubiquitous. The idea comes from Barad's (2007) relational ontology, which stresses that all material – including the myriad entanglements of human and non-human bodies – is constantly proceeding “together in relation to and with one another” (Barad, 2007, p. 35). In this new materialist view, for instance, knowledge is regarded as embodied and entangled in human and non-human bodies, as well as being situational and temporary (Toohey, 2019). Accordingly, learning language is closely linked to embodiment because language is not seen as a simple abstract system that individual learners can acquire (e.g., García & Wei, 2014); rather, it concerns humans and non-humans and their constantly changing bodies. As education scholar, MacLure (2013) emphasised in their post-qualitative study, “language is in and of the body; always issuing from the body; being impeded by the body; affecting other bodies” (p. 663; see also Toohey, 2019).

To conclude, the understanding of the material nature of embodiment–also related to language and language learning–is foregrounded within the post-qualitative framework. Next, we examine the notion of intra-action, which is a concept from Barad's agential realist theory, and which will help us to ponder this material dimension of embodiment further. In particular, we focus on the possibilities that “intra-action” could open concerning the conceptual coordination of transdisciplinary research. According to Bozalek and Zembylas (2018), a post-qualitative (diffractive) methodology in which the concept is extensively used allows for “true transdisciplinary rather than interdisciplinary” (p. 51) understanding.

3 From intra-action to intratwining

The concept of intra-action is considered a central notion in new materialism and is also associated with the new and rapidly growing field of embodied language learning from an expanded view. It was introduced by physicist and feminist theorist Barad (2007; see also 2003) related to agential realism, a theory they elaborated based on Niels Bohr's interpretation of quantum mechanics and queer theory (e.g., Bozalek & Zembylas, 2018; Faye & Jaksland, 2021). With their theory, Barad aimed to demonstrate that quantum mechanics has implications for social theorising concerning the “epistemological and ontological issues that quantum physics forces us to confront” (Barad, 2007, p. 24). According to Barad (2003), there are no distinct individual entities, such as the observer (researcher), the observed, or the measuring instrument, because they are always already entangled as “agentially intra-acting components” (p. 815), highlighting their ontological inseparability. That is, separate entities do not precede “but rather emerge from/through intra-actions” (Barad, 2007, p. 33). The concept of intra-action refers to “the relation of things changing and becoming together” (Toohey, 2019, p. 940), thus creating a material reality constantly anew. In other words, the notion of intra-action emphasises constant becoming instead of the ‘intra-static’ nature of being. Intra-action subverts accustomed causalities and unsettles beliefs on “individually constituted agents or entities” (Barad in the interview with Kleinman, 2012, p. 77). Perspectives of intra-action also challenge the

understanding of language as an independent system of structures, approaching it instead as *doing*, a verb form (e.g., Pennycook, 2018; Toohey, 2019). In this outlook, language is constantly becoming through intra-acting human and non-human bodies, including language users with their bodies, discourses and other related materials.

To further clarify the notion of intra-action, we take a closer look at the origin of the Latin prefixes of *intra* in comparison to *inter*. *Intra* refers to *within, inside, and inside one group*, and *inter* means *between and between two groups*⁴. In the context of music education, we could take the example of Learn-Finnish-by-Singing (LFBS) choirs, in which music and Finnish as a second language are integrated in equal and reciprocal ways, “transforming a musical practice into a hybrid practice” (Lehtinen-Schnabel, 2023, p. 486). This kind of practice could be called an *intra* practice, in which two disciplines merge and become one (emphasis on *within*). By comparison, in combining music with language learning in a language classroom, music is typically utilised in favour of supporting language learning and could thus be called an “*inter*” practice between two disciplines.

Incorporating the notion of action into these Latin prefixes and looking at the notions of interaction and intra-action bring forth their distinctive use at the paradigmatic level. Interaction, as an often-used term in the framework of qualitative research (e.g., constructivism, sociocultural theory), typically takes place between humans, with non-human entities (e.g., material and immaterial artefacts, cf. Vygotsky, 1978) considered “as context and/or mediations for human activity” (Toohey, 2019, p. 940; see also Kirschner & Martin, 2010). As discussed earlier, intra-action as a seemingly broad and complex new materialist concept highlights the multiplicity of entanglements of the human–non-human and material–discursive that are becoming (cf. materialising) together. Furthermore, interaction as a phenomenon often refers to diverse relationships between separate entities, whereas intra-action is related to phenomena that, according to Barad (2007), consist of the myriad entanglements of the human and non-human. In other words, phenomena point to relationality in which individual entities, that do not pre-exist, become their existence (materialise) in and through intra-action (see Barad in the interview with Kleinman, 2012).

Although research through posthumanist and new materialist approaches in music education is still in its early stages, there are some studies in which intra-action has been used as a conceptual lens (e.g., Crickmay & Keene, 2022; Kinsella et al., 2022; Kvile & Christophersen, 2023). For instance, Kinsella et al. (2022) explored – through the lens of intra-action – music education partnerships between formal schools and informal music providers in England. For this longitudinal research project, intra-action and the method of diffractive reading provided new understanding (e.g., unconscious reproduction of binaries between formal and informal music education) and possibilities for re-imagining musical practices. Kvile and Christophersen (2023) explored the intra-actions of the pupil (referring to an individual student) and music and the insights they provided in a Norwegian primary school context. Through these *pupilmusical* intra-actions, the children’s material–discursive engagements (e.g., individual fidgeting, humming, and making sounds in lessons during the school day) could be understood as constituting new learning opportunities that are closely entangled with the materiality of “being in the world” (p. 9) and with the multiplicity of ways of learning. Furthermore, Crickmay and Keene (2022) adopted the concept of intra-

⁴ <https://www.dictionary.com/e/inter-vs-intra/>

action by putting thematic and diffractive methods (e.g., qualitative and post-qualitative methods) into dialogue when exploring a participatory music project. The study showed that these different methods yielded similarities in content, differences in whether information or ambiguity and dialogue were produced, and connections that seemed to allow different kinds of valid knowledge. Overall, these studies that used intra-action as a conceptual lens employed the new materialist perspective as providing a new and different opportunity to approach and produce knowledge in the processes of music education research. According to these studies, intra-action is a potential concept that does not seek to “hold the material world at a distance” (Bozalek & Zembylas, 2018, p. 55) but emphasises the entanglements of material and discourse and their inexhaustible dynamism.

Intra-action, as a concept derived from new materialist thought, becomes, however, problematic when there is a need for approaching the different paradigms of the integrating and integrated disciplines related to transdisciplinary research. As underlined by post-qualitative scholars (see e.g., Bozalek & Zembylas, 2018; Mazzei & Jackson, 2023), this problem stems from onto-epistemological differences between qualitative and post-qualitative frameworks. It has also been argued that qualitative perspectives are not commensurable with post-qualitative perspectives as they are based on the premise of a humanist subject (e.g., St. Pierre, 2011, 2014). According to Väkevä (2023), a philosopher in arts education, posthumanist and new materialist perspectives are not at odds with the pragmatist interpretation of naturalism, which has, since its inception, criticised “the modern philosophical set-up where the epistemological relationship of the individuated human subject to the world is assumed to be of primary philosophical interest” (p. x). Nevertheless, intra-action as a new materialist notion does not appear to contribute to this study’s challenge of finding conceptualisations that could acknowledge different paradigms from the transdisciplinary point of view to articulate the embodied learning of language in and through music education. In this context, advancing critical conceptual coordination and transdisciplinary ethos would thus require moving beyond the boundaries of qualitative and post-qualitative perspectives on embodied language learning.

As music education researchers, we have encountered aforementioned challenges that stem from different paradigms used in different disciplines from the perspective of transdisciplinary research. Therefore, we believe that transdisciplinary research in music education, including the integration of music and language education, could benefit and be strengthened by approaches that acknowledge these complexities and the intersecting bodies of knowledge. Transdisciplinary research in its essence requires not only disciplinary (and professional) negotiation but also paradigmatic dialogue that could evolve through conceptual coordination, alignment and combination (Hirsch Hadorn et al., 2008; Pipere & Lorenzi, 2021). Following this line of thought, at least part of the content of theories from different paradigms could be compared and interlinked but it needs to be carefully and critically justified which parts and to what extent. We use as our example of conceptual coordination the concept of *intratwining*, a conceptual *assemblage* of intra-action and intertwining, which could act at the interface of different theoretical perspectives. In other words, through the development of this notion, we have systematically chosen the key concepts and explored their dimensions based on conceptual coordination that grounds this research work as a whole. Intratwining can, on one hand, be associated with the phenomena of human-non-human and material-discursive entanglements

related to the Baradian concept of intra-action and, on the other hand, with the mutual intertwining of the inside and outside world in line with the Deweyan notion of holistic experience (Dewey, 1963). That is, this conceptual assemblage awakens thinking with both intra-action and intertwining—approaching the concepts from ‘and/and’ not ‘either/or’ perspectives. Dewey denoted from his pragmatic point of view that the material environment is not separate but is holistically intertwined within human action (Dewey, 1963). In turn, from their new materialist perspective, Barad (2007, ix) contested the separation of human and non-human bodies as individual entities completely by claiming that being entangled, not intertwined, means “to lack an independent, self-contained existence” (p. ix). The distinction between the concepts of entanglement and intertwining has been described as either being part of the world (cf. entangled) or in the world (cf. intertwined) (e.g., Bozalek & Zembylas, 2018). The example of the new concept of intratwining calls for recognising these different paradigmatic perspectives, fostering an expanded transdisciplinary understanding. Importantly, we do not strive to fuse different paradigms with this example, but rather to promote the state of their *in-between-ness* (Jackson & Mazzei, 2017) that, to our understanding, is complex but pivotal in transdisciplinary research and practice.

We could again consider the example of LFBS choirs and ponder how the perspective of intratwining could potentially broaden the transdisciplinary understanding related to embodied language learning in them. Thus far, the double-meaning LFBS choir practice has been explored through the lens of (activity) systems thinking (e.g., sociocultural/cultural-historical perspective; see Lehtinen-Schnabel, 2023). The double meaning in the choir activity reveals change at different levels of music educational thinking and acting (e.g., blurring binaries between musical and non-musical outcomes of musical activity and boundaries between disciplines and professions) when integrating music and embodied learning of a second language (L2), with emphasis on “holistic” experience (Dewey, 1916, 1963). Wrestling with the concept of intratwining would also encourage taking the new materialist perspective into consideration regarding the research process. This could involve utilising prior research of both qualitative and post-qualitative approaches related to embodied language learning and bringing together the findings, insights and ideas they have produced in the light of their different ontological and epistemological understandings. Problematising, conceptualising, and understanding the phenomenon through the new materialist lens could create new ways to communicate between the disciplines of music and language education, enabling interconnections that might otherwise be out of reach. The concept of intratwining could also support articulating the materiality of the choir practice more precisely. This might encompass examining the empirical material (e.g. interviews, videos of lessons and concerts, researcher journal, field notes of the choir rehearsals) through the lens of diffractive analysis (see Barad, 2007, 2014). For instance, diverse entanglements and intra-actions of the non-human (e.g., musical instruments, spaces to move, chairs to sit, acoustics, computer and the smart board system to see the pictures and text of the song lyrics projected on the wall) and the human bodies of the choir participants, choir conductor, and L2 teacher could be outlined. This could potentially produce a new kind of nuanced understanding of the material nature of embodied L2 learning in the choirs. As a whole, “plugging in” (Jackson & Mazzei, 2017, p. 727) the notion of intratwining within the transdisciplinary exploration of embodied language learning in these double-

meaning choirs would challenge and expand thinking from a perspective typical or dominant in one's own discipline. That is, this specific example of conceptual coordination would require acknowledging qualitative and post-qualitative perspectives and, particularly, how they constitute different kinds of knowing and knowledge (based on their ontological and epistemological premises) in the context of embodied L2 use and learning.

4 Conclusions

In this conceptual study, we explored the ways in which transdisciplinary research and pedagogical practice on integrating music and language education could be enlarged through critical conceptual coordination. We have argued that to better acknowledge the essence of transdisciplinary ethos in research and pedagogical practice on music and language education from the perspective of embodied learning, we should find new conceptual approaches that move beyond disciplinary pluralism and cherish authentic, innovative, and open-minded understanding between different theoretical orientations. The article has shown that there are diverse challenges in finding concepts that could more broadly pervade transdisciplinary approaches in research and practice. Examining the concept of embodied learning from different theoretical perspectives (phenomenology, pragmatism, posthumanism, and new materialism) and focusing on the central new materialist notion of intra-action, we have developed the conceptual assemblage of intratwining. As an example and starting point, this concept conveys the intermediate state (in-between-ness) of theoretical perspectives and, as such, holds the potential to support conceptual coordination in transdisciplinary research on embodied language learning in and through music education. Through this concept, we also contribute a flexible, resilient and expanded understanding to transdisciplinary research and pedagogical practice that needs to deal with the conceptual multiplicity of different theoretical perspectives. We suggest moving towards unknown territories not only from the perspective of different disciplines but also of different paradigms. In line with the philosopher Bruno Latour (e.g., 1987), we believe that the conflict of disciplines does not slow down scientific progress; instead, it may help drive it forward if transdisciplinarity is understood and applied in its full meaning.

Based on the contributions of this article, our intention to find new conceptual coordinations also calls for building a heuristic aid that could expand the understanding of "transdisciplinary" from the perspective of arts and arts education, where the notion is often mixed up with "multidisciplinary" as well as associated with "instrumentalising arts" by the advocates of unidisciplinary understanding. This kind of thinking is still quite dominant, at least in the fields of music and music education (Allsup, 2017; see also Gaztambide-Fernández, 2013). Thus, the common notion of *arts-integrated language learning* within applied linguistics could also be approached through the lenses of *language-integrated arts learning* within arts and arts education. The same could also be applied, for instance, to the notions of *language research with/into/through the arts* (see Bradley & Harvey, 2019) for an expanded understanding of *arts research with/into/through language*. For us, as music education researchers and practitioners, notions such as *language-integrated music learning* or *music education research and practice with/into/through language* would better reveal the context (e.g., a choir or a language class) in which transdisciplinary teaching and learning takes place.

For example, considering the notions of a song (music) and singing (musical activity), music and language are inseparably entangled with one another. They are entangled through rhythm and timing, sounds of music and language, sentences and musical phrases, expression of music and lyrics, processing of melodies sound-by-sound and words syllable-by-syllable, and so on. When listening to or singing a song, there is no need to separate music and language; instead, they are entangled – in terms of pragmatism – through holistic experience (cf. Dewey, 1916, MW 9). Through the lens of new materialism, listening to and singing a song is constituted by multiple entanglements, such as sound ways, moving and sensing bodies, affects/emotions, accompanying instruments, harmonies, technological equipment. Thus, in an educational context, depending on these material-discursive entanglements (cf. Barad, 2003), there are also different intra-actions of human and non-human bodies that create diverse opportunities for what integrating music and language learning can produce. Accordingly, when examining the settings for transdisciplinary teaching and learning, materials in a music educational context (e.g., filled with musical instruments, without tables, the active and embodied use of space) differ from materials that – in new materialist terms – are entangled and becoming together with the learners in a language classroom environment (e.g., a more “academic setting” with tables and books). Therefore, turning the conceptual thinking around (e.g., language-integrated music learning), as discussed above, could help to articulate the transdisciplinary ethos when integrating embodied language learning in and through music education. In practice, transdisciplinarity lies in how these disciplines can transform one another towards something new and how they can be approached pedagogically in an equal, reciprocal and non-hierarchical manner.

Instead of underlining the divergences between theoretical perspectives, we have strived to find interfaces that could aid in expanding transdisciplinary understanding between different disciplines, in this case, music and language education in the framework of embodied language learning. Nevertheless, concepts predominate, guide, and at times even paralyse researchers’ thinking within different paradigms. As we have shown, in transdisciplinary research and pedagogical practice, understanding conceptual differences becomes even more complex due to the integration of various disciplines. Hence, it can benefit from such approaches that not only encourage expanding understanding of the unfamiliar and uncommon but also inspire imagination towards new innovative insights and out-of-the-box thinking (see also Lather, 2006). The concept of intratwining as an example of critical conceptual coordination calls for “dialogic imagination” (Bakhtin, 1981, p. 275) between different theoretical perspectives, opening up an innovative “space for new thinking” (Crickmay & Keene, 2022, p. 283). For instance, it challenges education professionals to pay further attention to integrating embodiment and new materialist perspectives within the conceptualisations of becoming at the practical levels of education. Hopefully, this could, in line with the concept of social imagination (Greene, 1995), which follows the pragmatist tradition and highlights the idea of becoming in and through engagements with the arts, strengthen imaginative thinking at a more societal level as well. Such thinking directs towards discussions on meaningfulness and the broader social contributions of transdisciplinary conceptual and empirical research.

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