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Embodiment in composition: 4E theoretical considerations and empirical evidence from a case study

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Abstract

The purpose of this study was to theorise on a composer's corporeality from the point of view of the embodied, enacted, embedded, and extended cognition paradigm, in the light of empirical data that cover the compositional process of creating one particular piece of music. The data include related manuscripts and the composer's verbal account of those manuscripts. Composition is seen as an interactive coping behaviour and an adaptive process of knowledge acquisition and production in a sonic environment. In this epistemic process, the composer begins working with various kinds of ideas: sounds, timbres, musical structures, experiences, philosophical thoughts. They explicate these intuitive or reflective embodied representations through different kinds of externalisations, such as musical gestures, narratives, visualisation, and finally, musical notation. This study substantiates the way in which embodied, extrabodily, embedded, and enactive processes constitute the cognitive acts of a composer, usually considered as almost purely mental. It shows how musical composition may not only be grounded but also depend on embodied knowledge that the score only partly conveys. In addition to helping composers and performers communicate in real life, the findings may be useful for identifying the different cognitive premises and circumstances that can result in discrepancies between the ways in which they interpret musical notation.

Keywords

Composer, embodiment, enaction, learning, non-discursive knowledge, performance, 4E cognition

Introduction

Although recent research has focused on the cognitive processes and creativity of performers, the corporeal turn in music performance studies (e.g., Sheets-Johnstone, 2015) has so far attracted almost no attention in studies of composition, which remains the paradigmatic mental activity in the domain of music. Arguing against this dichotomy between musical creation and reproduction, Cook (2013) advocates the interconnectedness between the “two separate(d) musics” (p. 4). According to Cook, music theorists, aestheticians, and (modernist) composers tend to separate written from performed music and then underrate the importance of performance, at least in ontological terms. Taking the perspective of a performer, Cook questions the notion that “the musical work is an abstract and enduring entity, conceived in a more or less platonic manner; and second, that it is grounded in notation” (p. 13).

The purpose of this inquiry was to theorise on the embodied condition of a composer, from the point of view of the embodied/enactive, or embodied, embedded, extended, enactive (4E) cognition paradigm. I show that writing music is far from purely abstract or platonic and how musical work, from the point of view of a composer, is grounded in embodied knowledge that the score only partly conveys. The 4E cognition paradigm is reflected in and exemplified by data that were produced to

track one complete composing process, from germinal ideas all the way to the finished score, by a Finnish academic composer in the Western art music context, referred to here as the composer-informant. The data, referred to as the composer data, comprise all the manuscripts¹ created during the composing process as well as the composer-informant's verbal accounts describing those manuscripts. I substantiate my argument about the embodied nature of the compositional thinking process by adapting the composer data described above to Pozo's (2017) 4E learning theory. This explains the cognitive movement between embodied and symbolic forms of representation in terms of different levels of explicitation (Pozo, 2017) of these embodied representations by externalising them in different ways. The article is structured as follows. First, I explore the theoretical underpinnings of the physicality and materiality of musical practices in terms of the 4E cognition paradigm and collate adaptive learning behaviour with compositional practice. Then, following a section on methodology, I substantiate my thesis of compositional embodiment and creative work through explicitation and externalisation of embodied representations with examples from the composer data contextualised with appropriate research.

Enacted cognition in music

The 4E cognition theory states that human cognition is fundamentally embodied (i.e., inseparable from and moderated by the bodily conditions), enacted (i.e., not just contemplated but acted for and on in the world on a continuum between life and mind), embedded (i.e., situated in and scaffolded by the environment), and extended outside the skull-skin boundary to loop into the world of extracorporeal resources, both material and symbolic (Pozo, 2017; Ryan & Schiavio, 2019; van der Schyff et al., 2018). The 4E cognition theory manifests the most radical form of the embodied cognition paradigm, which is neither a unified nor unanimous discipline in terms of ontological or epistemological premises (Clark & Kiverstein, 2009; Menary, 2010; Newen et al., 2018; Schiavio & van der Schyff, 2018). Instead, there is an ongoing dispute as to the empirical grounds for and reading of extracranial processes, considered to be merely embodied or extended, and extrabodily processes, considered to be merely consequences or proper constituents of intracranial and embodied processes, in cognitive processing (Newen et al., 2018).

Although music research has widely adapted the embodied/enacted cognitive paradigm (Geeves & Sutton, 2014; Leman et al., 2018; Maes et al., 2014; Matyja & Schiavio, 2013; Ryan & Schiavio, 2019; Reybrouck, 2006b; Schiavio et al., 2014; van der Schyff et al., 2018), the conception of embodiment in many studies may be poorly defined and take different, rather unconnected disciplinary perspectives (Geeves & Sutton, 2014; Kersten, 2017; Matyja & Schiavio, 2013). The neurobiological basis for linking musical phenomena with motor action simulation (i.e., enactment) is proposed to lie in the mirror neurons (e.g., Kohler et al., 2002; Lahav et al., 2007). A body of empirical evidence points out that "the effect of action is essential to making sense of music" (Lehman & Maes 2014, p. 237) and that hearing a sound instigates a sense of imagined participation with the production of that sound, especially among trained musicians (Maes et al., 2014). Research on embodied/enacted cognition in music has addressed music-induced movements (Leman et al., 2009; Godøy, 2010, 2019; Küssner et al., 2014), listener responses (Eitan & Granot, 2006), music education (Bowman, 2004; Elliott & Silverman, 2015; van der Schyff et al., 2016), and music performance (Lega et al., 2014; Stewart et al., 2013; Taylor & Witt, 2015), although if one disregards improvisation or musical creativity (van der Schyff et al., 2018; Iyer, 2004), the act of composing has mostly remained unresearched.

Composing as explicating embodied representations

The current study views embodied cognition according to the 4E cognition paradigm as formulated by Pozo (2017) in the context of learning and creative processes and adapted for instrumental music pedagogy by Casas-Mas et al. (2015, 2019). Pozo's 4E cognition model subscribes to the strong reading of embodied cognition that views cognitive processes as comprised of bodily, extrabodily, and enactive processes (Newen et al., 2018). In this study, embodiment is considered in a broad sense as consisting of neural, extra-neural, and sensorimotor capacities that drive cognitive processes and reflect the role of an agent's body engaging in its situated cognition (van der Schyff et al., 2018). Hence, embodiment in music is viewed as encompassing a variety of phenomena, from the sensations of the agent's own body states (metabolic, thermo-regulative, perceptual, kinaesthetic, etc.) to emotions, movements, and even to linguistic phenomena such as the metaphoric expressions of movement, material, and space that reflect the physical aspects of reality (Hatten, 2004, 93–94; Johnson & Larson, 2003).

According to 4E cognition, our implicit representations² are embodied in nature (Dorfman et al., 1996; Holland & de Vries, 2010; Pozo, 2017; Sun & Wilson, 2014). An embodied representation, although grounded in “the properties of the real world . . . constrained by the way the body interacts with the world,” and “transduced by perceptual-action systems” that render meaning, will therefore sometimes reflect but “subtle, fuzzy variations in the world” (Glenberg, 1997, p. 3; see also Prinz & Barsalou, 2000). These more or less fuzzy implicit embodied representations, although being carried by, through, and with the body, convey preconscious information and have also been called intuitions (Betsch & Glöckner, 2010; Dreyfus & Dreyfus, 1986, 28–29; Epstein, 2010), knowhow, or body knowledge (Zembylas & Niederauer, 2018, pp. 97–101, drawing on the concepts of knowledge established by John Dewey, Gilbert Ryle, and Michel Polanyi).³ Implicit embodied representations have functional primacy over explicit knowledge in all cognising (Claxton, 2005; Pozo, 2017; Reber, 1993). Hence, and especially in learning and in creative processes, the fuzziness of the embodied representations entails and induces human cognition into movement to gain more abstract forms of representation, and in all theoretical conceptualisation and creative production, these representations need to be brought under deliberate control to be explicating (Pozo, 2017). According to Pozo, cognitive processes result in a continuum of the embodied mind and the symbolic mind, where cognition, including the processes of learning and creation, is in constant motion. This cognitive motion goes seamlessly back and forth from deeply embodied representations (e.g., cognising a feeling of warmth indicating a vague idea, imagining sounds and timbres or the movement of one's fingers on the keyboard) to the most abstract ideas (e.g., musical structures). To move up and down the stairs of the explicative layers, so to speak, the mind needs various tools that help it to grasp the embodied cognitive states to be comprehended and formulated (Wilson & Foglia, 2015). These tools, according to Pozo (2017), take shape in different types of externalisation of the representation.

Pozo (2017) categorises six different, but partially overlapping, levels of explicitation of embodied representations in the continuum between fully embodied and abstract externalisations: bodily actions, gestures, objects, oral language (narratives), external codified (visual) representations, and external representation systems (notation).⁴ The process of explicitation, however, is not a straightforward one. Dissociation between implicit embodied and explicit knowledge is common and takes place, for instance, in stereotypical thinking (Pozo, 2017), where a person intuitively and inappropriately generalises a common feature (e.g., being good at maths) of an individual (e.g., a musician) to represent the whole group (e.g., all musicians are good at maths). Further, a learning situation often entails various scholarly challenges that grow out of dissociation between embodied and explicit knowledge. This is the case when a young music student, although recognising the

tension in a musical passage and maybe even experiencing bodily arousal (embodied representation), is unable to attribute that perception to the cadenza and the change of keys between the first and second theme of a sonata (explicit knowledge). The dissociation between embodied representation and explicit knowledge may be overcome by conceptual change (Vosniadou, 2008) and through different explicitation processes. Pozo (2017) theorises the explicitation process in the process of learning, which, for him, indicates the gradual process of explicitation through the externalisation of the embodied cognitive states, where implicit embodied representations are being expressed in another mode. During this explicitation process, representational re-description (i.e., conceptual change) takes place, in which the implicit embodied representations are converted into another mode of information and, eventually, into fully explicit representations (Karmiloff-Smith, 1992). For instance, in the case of the sonata themes, different cadenzas and sonata expositions are being analysed, played, and pointed out in the score while listening.

Learning as composing

In the current study, Pozo's 4E learning theory is adapted to the creative process of music composition. Whereas Pozo (2017) briefly parallels the creative process with the learning process, his focus is on the phenomenon of learning. Though certainly not identical, some of the same cognitive processes encompass both learning and creative processes. Learning in particular, in its deepest sense, elucidated by Mezirow (2018) as transformative (i.e., changing, via critical self-reflection, "problematic frames of mindsets" [p. 116], into, mindsets, habits of mind, meaning, perspectives that will be more true, justified, or better guide action) and by Biggs (1999) as enhanced (i.e., using the higher-order learning activities of theorising, applying, relating, explaining, describing, note-taking, and memorising to intensify understanding), shares important similarities with the creative process: both processes may be seen, as with Piaget, as adaptive behaviour in a specific environment that results in new understanding and knowledge structures. Similarly, Reybrouck (2006a), grounded in the Piagetian-Vygotskian view of cognitive development and learning, sees creativity in music as accommodative and assimilative coping processes in interaction with the environment. He sees musical sense-making "in terms of interactions with sounds, both at the level of perception, action and mental processing" (Reybrouck, 2012, p. 392) and composition as the "adaptive process of 'knowledge acquisition'" (Reybrouck, 2006b, p. 42). For Reybrouck, compositional creation is essentially material and embodied "coping with the sonic world" (Reybrouck, 2005, p. 45). Further, Reybrouck (2012; see also Lerdahl, 2003) analyses the mechanism that links musical experience into virtual bodily movement. He argues that experiencing music involves mental simulation of movement "in terms of preconceptual bodily experiences or bodily based image schemata" without the action being manifest (Reybrouck, 2012, p. 405). It corresponds to so-called internal imagery that enables the transition from overt action into internalised forms of action. The whole process invokes a kind of motor empathy and ideomotor simulation, allowing the listener to experience music as something that moves over time, while simultaneously experiencing this movement as the movement of their own body (Reybrouck, 2012; see also Schiavio et al., 2014).

Both learning and creation entail a dissociation between embodied and explicit representations that need to be acted on. In the context of transformative learning, a person aims to construe an existing knowledge structure that is nevertheless new to them, personally. A music student learns, for instance, to identify the tension (an embodied experience) in a sonata exposition between the main and subordinate themes and attribute it to key changes (an explicit representation). In contrast, regarding the creative process, the disruptive dissociation lies between the embodied intuitive, or reflective ideas, and the potential need to transform those ideas into sounding images and ultimately musical notation. In the artistic process of composition, conceptual change and the representational

explicitation process entail the production of new musical knowledge. The musical score is loaded with novel information structures (i.e., musical passages) fabricated from different kinds of artistic ideas, embodied or discursive, and conveyed by any one or more of the five senses (Bailes & Bishop, 2012; Pohjannoro, 2012a; 2012b; Pohjannoro & Rousi, 2018). To translate those ideas into musical notation, the processes of conceptual change and explicitation of representations through their externalisation are vital.

The creative process, viewed as the process of representational explicitation (Bruner, 1966; Pozo, 2017) and conceptual change (Vosniadou, 2008), entail learning—and vice versa— learning is always more or less creative, at least in the minimal, individualistic sense. Zembylas and Niederauer (2018, pp. 93–97) recognise constant learning as the crucial prerequisite for compositional work, and the author of the current study has elsewhere showed the interconnectedness of compositional endeavour and the advantageousness and, indeed, even necessity of learning when composing (Pohjannoro, 2016). The invention of new musical materials and structures and the concurrent process of learning those materials and their potential proved to be a crucial element in the composer-informant’s coping in his unique working circumstances, which were characterised by uncertainty and complexity (Pohjannoro, 2016; see Schön, 1983). In fact, the cognitive acts performed in the processes of compositional creation (testing, associating, theorising, juxtaposing, applying, and developing the compositional ideas into new musical situations) were found to be identical to acts in enhanced learning demonstrated by Biggs (1999; Pohjannoro, 2016). In the current study, the composing process is viewed as an adaptive process of knowledge acquisition and production, as a progressive explicitation process where implicit/intuitive embodied representations (i.e., compositional ideas such as “whiteness,” “sounding spaces,” and “continuous melody”) as well as more explicit (e.g., “rhythms parting from a repetitive field” and “pulsating vs. not pulsating rhythms” that reflect “differences in conceptualising time”) are converted into symbolic information (notation) through explicitation into diverse external forms.⁵

Method

The composer-informant had been active, when the data were produced, on the national and international Western art music scene for more than 20 years. Over this time he has gained a certain amount of international recognition. The composition whose process of creation was tracked was a commission by a Middle European percussion quartet, and it has been performed several times nationally and internationally.

The manuscript data comprises four material matrices (i.e., charts of basic and modified rhythm patterns showing the systematic creation, elaboration, and investigation of part of the musical material of the composition-to-be) input to the computer using notation software and annotated and supplemented by hand, 11 handmade sketches, and 17 versions of the computer-notated score with additions in handwriting. The verbal data were produced over 4 months at the turn of 2004–2005 during 10 visits to the studio of the composer-informant. Three additional visits were made: one orientation interview (11 months before the first interview), one supplemental (23 months after the last interview), and one additional visit (90 months after the last interview). The interview data were initially produced with the aim of tracking a complete compositional decision-making process, and the sessions involved the composer-informant recounting the actions and thoughts behind his latest manuscripts, which was facilitated by re-reading those manuscripts and prompted by my questions, such as “Can you tell me what you were thinking here?” Having been acquainted with the composer-informant for a long time, it was easy for me to dig deep into his compositional decision-

making and the snags he encountered, and in terms of the validity issues, it was illuminating to see there were times when even the composer-informant occasionally lost his way.

The verbal data (406 minutes and 29,000 words of verbatim transcripts) and copies of the manuscripts are in the possession of the author of this paper.

The analysis of the data was grounded on previous analyses, especially on the coding schemes of different modes of compositional knowledge representation (enactive, iconic, symbolic-iconic, symbolic; Pohjannoro & Rousi, 2018) and different modes of information processing: intuitive (imagination, experimentation, incubation, restructuring), reflective (analytic viewing of music, contemplating alternatives, rule-based processing), and meta-cognitive (making plans, establishing musical goals, evaluating) (Pohjannoro, 2014; 2016). For the purposes of the current study, a qualitative thematic analysis was carried out to extract verbalisations that expressed physical, corporeal (including intuitive accounts), and material dimensions. The drawings singled out from the manuscript data and the ways in which they were interpreted were juxtaposed and cross-validated against matching verbal data (Ericsson, 2003). Lastly, member-check validation was performed (Creswell & Miller, 2000) with the composer-informant exploring and agreeing with the results and approving the inclusion of his contribution to the research in the publication of the present article.

In the next section I explore the groundedness of compositional thinking in embodied, enacted, embedded, and extended cognition by identifying the levels of explicitation of embodied representations in the composer data described above.

Bodily (Re)actions in the composer's studio

The first level of making an implicit embodied representation explicit is to show it with one's body. This kind of modelling is constantly done by the teacher in instrumental music lessons, in ensemble rehearsals and whenever pointing out the time flow or some important entries in a score, while listening to or talking about music. Occasionally, the composer-informant imagined the movements by the performer when notating a passage for the relevant instrument and asking himself "Is this playable, is this idiomatic?" Further, imagining the sound of or notating a musical event for a specific musical instrument may appear automatically in the mind of a composer as the gesture made by the performer while playing that sound or musical event on their instrument (Godøy, 2010). This was often the case in the composer data, exemplified by an episode in which the composer-informant pondered the potential actions of two percussionists: "[T]his [passage] will be continuous without any pauses so that they [the performers] are not able to change the mallets, unless I write a pause for someone."

The most substantial bodily composing movements are those that produce the score. What are the constraints on composition when a composer uses notation software rather than making marks by hand, on paper with a pencil? The composer-informant in the current study spoke about "fooling" the software he uses to be able to write music without time signatures or bar lines, because it is set up in such a way where typically notes can only be added to bars. He appeared to be fully aware of the constraints of the software, and proficient in bypassing them to minimise its disadvantages and maximise its advantages. These include its copy-and-paste and delete-and-replace functions, which contribute to the efficiency with which he works. In the current study the composer-informant used the computer as though it were a word processor, other than for some minor generative functions while creating the material matrices. He outlined the formal structures of the piece and annotated and supplemented the score, once it had been prepared, using pencil and paper. According to the

composer-informant, handwriting “gives a down-to-earth feeling.” This implies differences between the practical and/or epistemological consequences of composing by hand and using notation software.⁷

The bodily actions of a composer that can be observed, when they are not experimenting using a musical instrument or working with another musician, may be limited mostly to writing by hand or using a computer. Compositional embodiment can be inferred, however, not only from their observable bodily actions but from their intuition, too, or gut feeling, which is also experienced by the body. Although even “purely rational” cognition may inherently be grounded in perceptual information, and perception and intuitive understanding play an underlying role in the representation of analytic knowledge (e.g., Barsalou, 1999), perception and intuition are more obviously transmitted with and through the body. Intuitions have been linked to affective mechanisms that induce physiological changes (Hochman et al., 2009), and they usually come with a certain feeling of “rightness” (Thompson et al., 2011, pp. 108–109) and “warmth” (Metcalfe & Wiebe, 1987, pp. 238–239). A person tends to be more or less apt to believe in these intuitions, according to personal inclination (Epstein et al., 1996; Witteman et al., 2009). Empirical evidence provided by Zembylas and Niederauer (2018), grounding in the work of Merleau-Ponty (1945/2005, p. 114 ff.), Dreyfus (2002) and Shusterman (2008), indicates the important role of the composer’s body in the production of musical knowledge. Zembylas and Niederauer (2018) define this “body knowledge” as forming a special part of the practical non-discursive knowledge of a composer and speak about “the body as a knowing unity,” “judgement-by-the-body,” “embodied intelligence,” “knowledge through body,” and “embodied knowledge” (pp. 87–89, 100; see also Hodgkinson et al., 2008; Pozo, 2017). Hence, intuitive compositional actions and decision-making are viewed as bodily actions in the current study. According to the results of my previous research on the compositional process, intuition plays a quintessential role in compositional thinking (Pohjannoro, 2014; 2016; Pohjannoro & Rousi, 2018). About half of the utterances by this seemingly extremely analytical composer-informant were identified as intuitive acts (Pohjannoro, 2016). Intuitive episodes were epitomised by his frequent comment “I’ll try this and let’s see what becomes of it” (cf. “trying out” in Zembylas & Niederauer, 2018, p. 86). He found them such hard work, especially when they involved incubation, that—in a follow-up interview to be reported in detail elsewhere—he reported suffering afterwards from exhaustion. This corroborates the notion that intuition, as the predominant mode of compositional thinking, is bodily action.

Gestures as suspended bodily action

A gesture, according to Pozo (2017), is the “essential bridge” (p. 19) between a direct bodily sensation and its origin, an act towards more abstract forms of representation. In other words, a gesture is a bodily movement that has partly been detached from its original function. Playing an air guitar is an example of a gesture that retains its links with the original action of producing sound from an instrument (Godøy, 2010).

Instead of frequently performing actual (i.e., substantive) physical movements,⁸ the composer-informant of this study speaks metaphorically about music that “moves.” The constant use of movement and transition metaphors as descriptions of “significant energetic shaping through time”—Hatten’s (2004, p. 95) definition of a musical gesture—shows the composer-informant in the process of making sounds or forms move.⁹ Thus, by constructing musical structures that convey some kind of expressivity or significance—in other words, musical gestures that are reminiscent of movement—the composer-informant incorporates performative power into his music so that it “works” for him. This produces music that is loaded with personally significant intuitive decisions by the knowing body of the composer-informant.

Objects as external representations: musical instruments and sound

Each musical instrument encompasses a sound character of its own, depending on the sound-producing material and playing technique (e.g., string bowed or plucked, drumhead hit with a mallet or hands; Godøy, 2010).¹⁰ The previously described virtual presence of a performer in the studio of the composer-informant in the current study has an important implication: a musician in the act of playing is associated with a musical instrument that substantially belongs to the material world of objects with a certain quality of sound and timbre. Hovland (2019) writes about the material and physical aspects of sound and, based on his analysis of orchestration practices by Hector Berlioz, argues that the “acts of playing and composing on the guitar are inscribed in the score” and that “the physicality of these acts is still present and creates the specificity of the orchestral writing.” Further, he claims that “[t]he acts do not simply condition the orchestral writing, they are present in, and constitute the particularity of, the score” (p. 9).

Sound and timbre are often linked to a certain character or mood that the composer-informant strives for, as well as the other way around. The technical features and sound characters of a specific instrument and the playing technique applied to it do not completely define the instrument, however. Rather, a musical instrument comes with a whole ecology of societal, cultural, historical and practical matters that are attached to that instrument and learnt in social interaction (Godøy, 2010; Hogg, 2011; Hultberg, 2002). Values, attitudes, artistic styles, functions, and other practices—mostly unconscious or non-verbalised—are all embedded in the acquisition of technical knowhow in relation to the musical instrument (Cope & Smith, 1997). Bennett Hogg writes about the “ecology” of playing the violin, which is:

Saturated with cultural meanings, both as an object and from the standpoint of the sounds it produces . . . I did take lessons and have learned to play the violin, though much of this learning has been relatively unconsciously achieved simply by virtue of growing up in a culture that has violins and violin music . . . The inner states that I imagine being externalised onto the violin are not in themselves ordinary and instinctive, but have found their way inside, as it were, through the enactive nature of my own embodied consciousness and the inescapably culturally mediated condition of every object with which I interact. (Hogg, 2011, p. 87)

In the composer data, the composer-informant explained his tentative ideas of placing four groups of percussion instruments on the stage. Considering the material aspects of the musical instruments to manage the acoustic sound in space, he pondered whether the instruments should be put side by side, or facing each other in opposite corners. Further, the materiality of musical instruments was present when the composer-informant considered the different kinds of mallets a percussionist would choose according to his notational decisions, notational inscriptions, and written instructions intended to convey his aspirations for the timbre and character of the composition.

Oral narratives as explication of action

Pozo (2017) considers oral narrative, told for other people or for oneself (e.g., self-narrative, private speech, self-talk), as the first stage of the detachment of a representation from its embodied origin. Although narration takes representation into the realm of linguistics, compared with a fully abstract representation, it still partly holds to its contextual and embodied meaning.

The short narratives provided by the composer-informant served two functions:11 as a metacognitive tool and as an aid to memory (Pohjannoro & Rousi, 2018). First, narrative accounts reflected the metacognitive level of compositional thinking. Narratives occurred when the composer either explained plans of action or recalled what had been done before. In the next quotation, the composer-informant organises his working procedures to tackle the recursive and lengthy endeavour of one extensive passage in the evolving piece in an aesthetically coherent way:

What I will have to do is . . . First, I outline the beginning and then the ending and then what comes into the middle. In that way, one should hope to fashion a unified whole.

Second, the composer-informant used short narratives to remember a certain mood that he wanted to convey when creating a particular musical event. These usually referred to an actual event in a definite location, such as an idea having occurred to him in a church or late at night at home. The composer-informant seldom used terms such as sad and happy, often used in the literature on music and emotion, to explain his expressive aspirations. Instead, aspirations were clarified using either technical terms or metaphorical language:

It is a gesture after the first half of the first second notation [proportional notation, i.e., without time signature or bar lines; the time line is indicated by seconds] event. This [the formal structure] is not meant to take shape in a hierarchical way, or any boundaries for that matter, I mean structural boundaries.

There is a certain feeling of floating in this space music [music without metric pulse, “without time;” notated with proportional notation and without bar lines], at least so far, anyway. Maybe it shows to the listeners . . . I mean, at the end of the day the listener cannot know how the music has been written: with bars or with second [i.e., proportional] notation, or whatever. But this is meant to present different experiences of rhythm and time, so that it would present two different worlds that encounter each other in different ways in different spaces.

Rather than creating a certain feeling, the composer may construct and present a specific musical world, habitat, and space to be explored and experienced. How the listener will perceive and react to that habitat is not dictated by the composer-informant, however. The composer-informant sometimes even writes poems. The function of the poems is to remember a specific mood or an emotional experience, or a combination of different moods and events (Pohjannoro & Rousi, 2018).

External codified representations: Visualisation

The lowest stage of coded symbolic representation, according to Pozo (2017; see also Bruner, 1966), is visualisation. Visualising a representation entails a re-description of the embodied experiences, thus equipping them with a new visual meaning and allowing them to transcend their situated (i.e., embodied) perspective.

In the composer data, visualisation serves four different functions (Pohjannoro & Rousi, 2018). First, the composer-informant drew maps to design the formal structure of the composition. Although most of his manuscripts were in musical notation, the formal structure was mostly depicted in a non-notational way, albeit usually with notes at the side. Some of the composer-informant’s germinal ideas manifested themselves in the form of visual images and this constitutes the second function of visual representation. In the beginning of the composing process, the

composer-informant pictured the sound characters of the future piece in his diary with the words “whiteness,” “glacier,” “sculpture,” and “fresco.” Later on, he borrowed visual metaphors from nature when I asked about his germinal idea of “sameness” and about its rendering into the development of musical structures: “I mean that kind of similar familiarity or kinship as, for instance, what could be a good example. . . Like birch leaves. They have that kind of similarity I am looking for.”

Third, the composer-informant used visualisation as a tool for memorising experiences and events. An emotional experience or specific mood may be linked with a visual image, which again helps him when retrieving the idea later on, as discussed above in relation to narratives. Last, the composer used tactile and visual metaphors, such as “grasping” and “seeing the big picture” when referring to intuitive decisions or evaluations; as he said, “I really couldn’t say how it helps. It just looks OK.”

Notation as external representation system

Of the explicative representations described by Pozo (2017), the musical score represents abstraction, the highest level of representation. It may be seen as an external representation system in the form of a “a structural set of symbolic expressions or inscriptions that allow us to represent different kinds of musical knowledge” (Peréz-Echevarría, 2017, p. 114; Pohjannoro & Rousi, 2018). The preliminary sketches and the score also serve a practical purpose for the composer, however, as they function as an external memory device. In epistemic terms, a composer can look at their creation from a distance once they have externalised their musical ideas as notes. Ideas may be rethought, analysis and assessment are enabled, recall is made easier, and new operations can be carried out on the musical material (Pohjannoro, 2016).

According to the composer data, the score was produced layer by layer and section by section so that at many points the work happened almost simultaneously all over the score (Pohjannoro, 2014). By no means did it evolve neatly measure by measure, although the composer did begin his endeavour from the first bar of the first movement and continue by moving straight forward, for a while. However, he wrote down the results of only the decisions that were easiest to make, whereas arduous, fussy, or difficult questions, and many of those concerning small details, remained unanswered and the staves were left unfinished or completely empty. In one of the last phases of the compositional process, the composer printed out the whole score and spread all the papers on the floor to recall and evaluate the piece in its entirety, “in order to see the big picture.” The very last phase included proofreading and making final amendments.

Discussion

Music students, performers as well as composers, adapt to different ways of musicking (a verb coined by Small, 1998, to encompass all kinds of behaviour related to music; see also Elliott & Silverman, 2015; Ryan & Schiavio, 2019), and to some extent they also adapt to the habitual conventions and ways of communication in the community of practice (Wenger, 2002) at the same music academy (Doğantan-Dack, 2015; Duffy & Broad, 2015). Musicking includes various aspects of musical behaviour, especially listening, performing, and composing, as well as other musical phenomena, such as style, aesthetics, theory and analysis, history, and technology. Although most musicking is embodied and non-discursive, conceptual metaphors are typically used in discourse in music learning situations (Brenner & Strand, 2013; Meissner, 2017; Wolfe, 2018)—in fact, whenever musical phenomena are being verbalised—to point out or explicate specific characteristics in the music at hand (Reybrouck & Brattico, 2015). The education of performers and

composers results in a body of intersubjective musical knowledge that rests on the embodied knowledge emerging from shared experiences in producing and listening to music and sound, supplemented by discursive information attached to those experiences. Musical meaning is to a great extent non-discursive, and even discursive musical signification is grounded in practical or perceptual components. Moreover, musical signification, occurring in any form of musicking, is always produced, learned, and communicated in a specific context. Therefore, all musical information and cognition are deeply embedded in their contexts. Even the most abstract notational structure—written or performed—is rooted in and necessitates the embedded knowledge of the physical and material aspects of the sound it represents, of the material source of the sound, and of the way it is produced.

From embodied representation, the first step towards abstract forms of understanding in musicking usually involves metaphorical expressions such as “Imagine that you have a ball inside your palm” and, according to the composer data, “This note goes here.” Then more analytical discourse emerges: “Keep your knuckles up high” or “Here is a periodic structure,” as the composer-informant in the current study commented on one section of his manuscript. In the process of explicating compositional ideas through externalisation, the composer-informant also drew on visual representations. The next level of explicitation, the materiality of the sound, was manifested in the composer data when the composer-informant created sound and timbre, which were sooner or later associated with the way they were produced on a particular instrument. The function of musical instruments as a source, affordance, and constraint of the process of musical knowledge production, is epistemic for a composer. Reybrouck (2006a) views musical instruments as extensions of natural (i.e., perceptual) epistemological “tools for music knowledge acquisition” (p. 59). Pozo (2017) refers to Vygotsky (1978) when he argues that musical instruments have the power to transform the minds of their users. An instrumentalist gradually learns to consider musical matters in terms of their instrument, and a composer adopts at least parts of this view and learns to write the score in an idiomatic, playable way (De Souza, 2017; Hogg, 2011).¹² Indeed, musical instruments in a composer’s studio or mind become symbolic mediators of the compositional actions that are executed with them. Appropriate communication between a composer and a performer through a musical score depends on the level of each party’s awareness of the ecology of each musical instrument (Godøy, 2010; Hogg, 2011).

Compositional knowledge and understanding, however abstract or intellectual, are grounded on physical and material aspects of music: the materiality of the sound, the musical instruments producing that sound, and the physical acts that operate those instruments. This materiality of music constitutes the important but tacit grounds for co-understanding between composers and performers. Musical notation has the capacity to be the mediator of musical knowledge (Marín et al., 2012). However, although it may be a fully offline (unsituated, uncontextualised, abstract) device for representing musical information, musical notation is unable to convey, in a straightforward way, the totality of the embodied information necessary for its expressive performance. In other words, musical notation is not the sole definer of certain bodily actions for the performer (Hultberg, 2002) because notation cannot convey all the instrument-related knowledge, especially the practices and conventions regarding the notation of music for the specific instrument, required in its creation or in its performance. In other words, a significant part of musical information, whether related to notation or practice, is embedded and hence irreducible to symbolic information. As a result, if the score is notated inappropriately or the performer cannot contextualise the notational information according to the composer’s presuppositions about a (competent) performer, the musical text may be misinterpreted or even considered unplayable. Godøy’s (2010) proposal that musical works could and should be understood as “rich, multidimensional gestural scripts in interaction with sound” (p. 122) thus fully aligns with the arguments and findings presented in this article not only as the

natural stance of a performer towards a score but as an important factor in the knowhow of a composer.

Therefore, the embeddedness of musical knowledge, which is always “situated in an environment from which it cannot be separated without losing its meaning” (Poza, 2017, p. 5), while providing a shared experiential platform, that is, potentiality for mutual understanding between composers and performers may in some other cases entail discontinuities in the communication between them. These possible discontinuities are the inevitable ramification of the salient embeddedness of musical information: much musical knowhow can only be learnt experientially by doing and may not be fully conveyed by symbolic means, which highlights the situational factor in musical cognition and comprises phenomena from emotional and expressive matters through interpretive and stylistic issues to playing techniques and practices.

Even the simplest “reproduction” of a score, seen as a prescription for a normative performance (see Hultberg, 2002), necessitates technical skill in playing an instrument. Notation also affords an explorative function for an instrumental or vocal musician who unravels and performs the expression implicit in the score (Hultberg, 2002). When the performer is exploring the music, that is, decoding “the general musical message and complete the missing information through investigation of implicit meaning” (Hultberg, 2002, p. 193), they are exploring musical gestures. These were shaped by the composer when making the sounds move, lending the score its performative power, which is to be unleashed by the performer. Thus the performer interprets the musical gestures, with the help of historical, analytical, and stylistic knowledge both discursive and non-discursive, to form a cohesive narration of those gestures conveyed by their bodily movements (Almén, 2008; Männikkö, 2018). The narrative of the performer may never equal that of the composer, however. Rather, the performative power and credibility of music lies in the cohesion and congruence in the structures of the gestural narratives embedded by the composer in the score and realised by the performer in the performance. The substance of the composer’s narrative may remain concealed to the performer as may the performer’s narrative to the audience. The ability of the three parties to grasp these two narratives depends on their mutual sensitivity and cultural understanding.

According to the composer data reported in the current study, neither notation nor musical sounds as such carry meanings in and of themselves; rather, they represent complex and saturated sets of relationships between physical sounds, bodily and emotional responses, actions and reactions, personal associations, and cultural signification, gestures, and learned expectations. Metaphorically speaking, musical compositions are dwellings constructed by the transformation of embodied representations and cognitive movement into musical structures as the result of innumerable smaller and larger meaningful compositional acts. These musical structures are available for performers to furnish with saturated expressivity and meaningfulness (Vadén & Torvinen, 2019) for imaginative listeners to inhabit over time. These sound dwellings, so to speak, give listeners the corporeal encounter of “direct, sensory-motor engagement with music” where “music literally ‘moves’ people . . . and they feel they are immersed in, and resonate with, the physical sound energy” (Maes et al., 2014, p. 67).

Conclusion

In this article I aimed to elucidate and substantiate the notion of compositional embodiment, enaction, and embeddedness, and their connections with musical performance, by presenting a case study of a composer-informant’s compositional process in a naturalistic setting as empirical evidence of the embodiment/enactive paradigm.

Although the current study does not claim to be representative of all composers in all respects and details, Pozo's (2017) levels of explicitation describe human conduct in general and my discussion, and the conclusions I draw from the case study, may therefore apply to many composers, particularly in the context of Western art music (Gomm et al., 2009). In addition to helping composers and performers communicate in real life, the findings may be useful for identifying the different cognitive premises and circumstances that can result in discrepancies between the ways in which they interpret musical notation.

Notes

1. The term manuscript is used as a hypernym for sketches (manuscripts written by hand), material matrices (charts created and/or transcribed with the computer that involve exploring musical material that has no place in the score for the moment), and score versions (manuscripts that include a certain notated section, movement, or the whole piece, written with the computer and usually annotated and supplemented by handwriting). This fully reflects the terminology that the composer-informant used during the studio interview sessions.

2. Although Pozo refers to representation, the term should not be read in its traditional meaning in cognitive psychology as mental images reflected in the brain. Thus, representation in the current study should be understood in a broad sense, entailing all kinds of cognitive states, be they embodied or conceptual.

3. I use knowledge as an umbrella term for propositional/discursive and different kinds of non-propositional/non-discursive knowledge, such as implicit, tacit, procedural, body knowledge, and knowhow. I view all knowledge as initially (and at least partly) embodied, according to Merleau-Pontian and the 4E approach. Pohjannoro 421

4. Unsurprisingly, these categories roughly match Bruner's (1966) enactive, iconic, and symbolic modes of information in his theory of instruction.

5. Although not all compositional ideas are implicit, the ideas of different kinds (musical, conceptual, sensual, etc.) must nevertheless be transformed into notation.

6. Incubation is defined in the current study as unconsciously contemplating a situation, falling into an idle mood or having a sudden insight while doing something other than composing (Pohjannoro, 2016). This use of an idle state of mind may indeed be a deliberate compositional device in the case of the composer-informant.

7. All notation software programs have their own constraints, offering different affordances to compositional thinking. Yet many composers prefer the physical and sensory characteristics of paper and pencil. Zembylas and Niederauer (2018) report that one composer in their study, for example, told them that his handwriting reveals "what's important for me" (p. 38).

8. It may commonly be observed that a composer, like the informant of the current study and any musician, makes gestures by moving the hands or swaying the head to picture the melodic contour or metric progression when reading, listening to, or imagining musical events.

9. Oramo (2014) explains the “tonally moving forms” described by Hanslick’s (1854/1986, p. 29) as being pushed (*bewegen*) to move, instead of moving by themselves (*sich bewegen*)—the mover clearly being the composer, or the performer.

10. The direction of the influence obviously extends in both directions; a sound idea will sooner or later be attached to a specific instrument and even to a particular playing technique.

11. The verbal composer data may be viewed as constituting a narrative, according to the narrative research paradigm (Clandinin & Connelly, 2000). Moreover, music as such may ontologically be perceived as (metaphorically) forming narratives constituted by different agents, modalities, and types of knowledge (Almén, 2008; Klein et al., 2013). In the current study, the term narrative is used in the epistemological/methodological sense to refer to short narrative episodes in the verbal data. Musical narrativity (Almén, 2008) is discussed in terms of the metaphorical expressions used by the composer-informant.

12. Composers notably differ in their knowledge of and attitude towards idiomaticity. Some composers are known to prioritise the playability of the score, whereas others focus on so-called purely musical and aesthetic considerations (see McCutchan, 1999). Also, one path to compositional innovation is to stretch the bodily and material capacities of musicians and their instruments (see Kostka, 2016).

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