The (f)utility of immersive experience in a live classical concert with extended reality: A comment on Lee's unified conceptual model

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Between November 2024 and January 2025 concertgoers gathered in Karlshorst in the east of Berlin to witness a short excerpt of live music from Gluck's *Orpheus and Euridice*, performed by the JungesKammerEnsemble of the Schostakowitsch-Musikschule Berlin-Lichtenberg, in a special setup: once with virtual reality (VR) headset and once without (see Figure 1). The goal of our community-based concert series, Orpheus Reimagined, was to find out how extending the physical reality of a live classical concert with VR elements would affect concertgoers' overall experience and appreciation. Would they accept wearing a VR headset during a concert? To what extent would emotional, aesthetic and social processes of the concert be altered, augmented or attenuated? Would audience members feel immersed?

Although VR technology is not new, the use of virtual or augmented reality in Western classical concert settings is a recent development, with scarce empirical evidence of how such settings change the perception and cognition of audience members and performers (Colotti, 2021; Selfridge & Barthet, 2019). The greater use of digital media in concert experiences has been driven in part by what Kavanagh (2018) describes as the "promise of the digital" for classical music institutions such as orchestras and concert halls: the possibility of reaching new audiences through new forms of distribution, mediation, and presentation. Blending physical and virtual elements or environments in live concerts leads to a sheer infinite number of possible configurations – and similarly varied are the mental states in which VR users find themselves. One key psychological concept associated with extended reality (XR), which is often used to refer to the broad range of virtual and augmented reality (AR) applications, is immersion. In a recent theoretical article, Lee (2025) discusses the concept of immersive experience in relation to other important terms that are commonly found in the literature, such as presence, involvement, or flow. The aim of his new "unified conceptual model of immersive experience in extended reality" is to provide a coherent framework for researchers interested in studying immersive experience in XR settings. Although much of the literature covered in his review is situated in gaming studies, he also draws on examples of XR in

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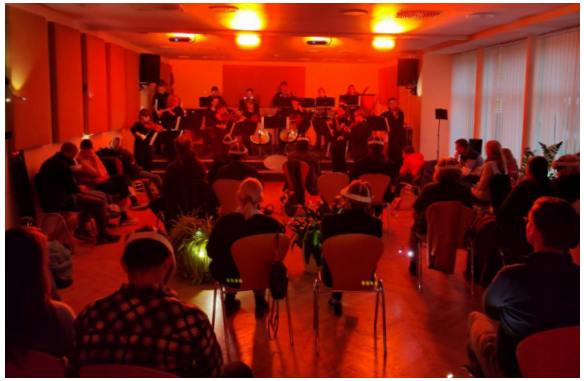

Figure 1. A performance from the Orpheus Reimagined concert series in action: Each concertgoer experienced the musical excerpt once with and once without extended reality. The average number of concertgoers per concert was nine (range: 4–17), not counting under 18s who were not eligible to take part in the main study. (Photo taken on Nov. 16, 2024 by Mats Küssner).

musical performances (such as a hypothetical example of an AR orchestral concert; Lee, 2025, p. 4). The model proposes that immersion is a result of three core elements that are brought about by immersive systems and content: 1) physical presence, 2) social presence/self presence, and 3) involvement, which are interconnected through narrative engagement, sensorimotor engagement, and task/motor engagement.

The aim of this essay is to apply this new model to our Orpheus Reimagined concert series with a view to critically reflecting on the three core elements and the immersive system/content in a virtually extended live music setting. By bringing Lee's model into dialogue with existing empirical and theoretical insights into the Western classical concert setting and its conventions, we aim to explore the (f)utility of the concept of immersive experience in XR classical concerts: In how far can a form of live musical experience such as the classical concert expand to include XR technologies? Would a truly immersive concert still be recognizable as a 'concert'? We will discuss each core element of Lee's model and offer reflections on the potential for XR to create immersive concerts, firstly in relation to the overarching concepts of 'presence' and 'involvement', and then in relation to Lee's proposed technical properties of immersive systems and content (plausibility, interactivity, interestingness), before drawing together further reflections on immersion and the futures and limits of classical concert experiences.

Presence: Physical Presence and Social/Self Presence

Physical presence is defined by Lee as "[t]he sense of being physically situated in a virtual environment and/or experienc-

ing virtual objects as if they exist in the real environment" (Lee, 2025, p. 6). In our XR concert series, we used the pass-through mode of Meta Quest 3 headsets such that audience members would find themselves in a cave-like environment with torches, lava, smoke, and floating ghosts, while still being able to see the musicians in front of them on stage (Figure 2) and, possibly, other audience members seated in the room in front of them. The content of the virtual environment and physical space were thus clearly separated: on the one hand, a digitally produced cave which cannot easily be mistaken for a real environment, and on the other, a small shot of the concert venue viewed inside the headset through the lens of a camera. Audience members could turn their heads away from the stage, 'immersing' themselves more fully in the virtual world. The music was always live and never played through the headset. The length of the performance was ca. 8 minutes. The short excerpt of instrumental music from Gluck's *Orpheus and Euridice* was from Scene 1 and 2 of Act 2 and was chosen as this passage lent itself to the creation of a virtual environment with a strong visual narrative. Given these coordinates of our setup, one can question whether the sensory input, both from the headset and the real environment, would have induced a

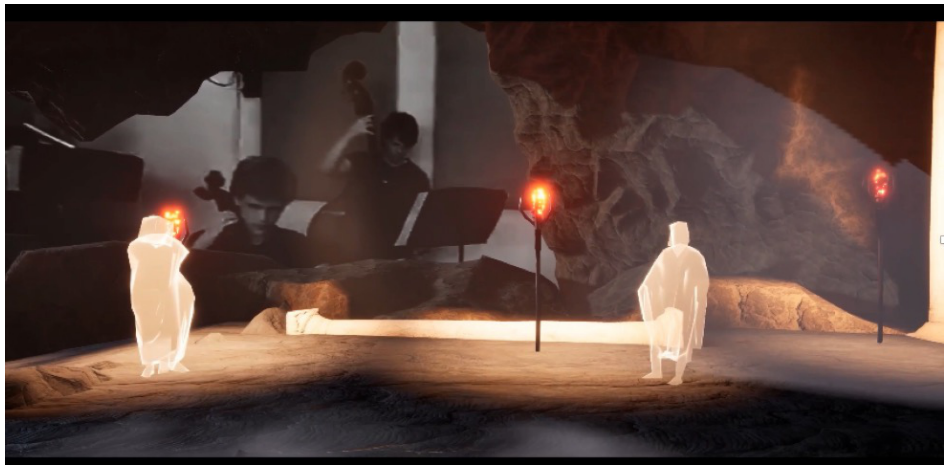

Figure 2. Virtual and real elements of the Orpheus Reimagined project. In the foreground: ghosts, torches, and a cave-like environment. In the background: musicians on stage as viewed through the pass-through mode of the VR headset. Half of the audience members are wearing VR headsets in pass-through mode, enabling them to see both the musicians on stage and a virtual environment.

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feeling of being physically present in a virtual world, or whether the virtual and real elements would have merged into a coherent feeling of physical presence.

Social presence is defined as "[t]he sense of perceiving virtual intelligences in a virtual or real environment as perceptually and/or socially real" (Lee, 2025, p. 7). The only "virtual intelligences" in our setup were the ghosts floating around the cave (referring to the furies that prevent Orpheus from entering the underworld in the second act of Gluck's opera). Two further layers of social presence can be identified in the Orpheus setup: the musicians, who are visible through the pass-through mode and the other audience members in the physical room. Although most other audience members were not visible through the headset, a concertgoer wearing a headset not only knew they were there, but perhaps also sensed them through touch or audition.

Self-presence is defined by Lee as "[t]he sense of being embodied into a virtual self in sensory and/or cognitive manners" (Lee, 2025, p. 7). In our concert setting, the virtual self played a very minor role and was only visible when audience members raised their hands or arms which were then translated into avatar limbs. Through motor engagement, though, concertgoers would get a sense that the virtual hand is 'theirs'. Our virtual environment had one hidden feature: people could push away approaching ghosts with their hands (who would otherwise 'pass through' the user). Only a few concertgoers were aware of this and tried it out, and it was perfectly possible to have the 'full' concert experience without using one's arms. The concept of self-presence seems thus more relevant in XR settings where users see themselves as (full) avatars and/or interact with other virtual beings. As such, one could argue that most concertgoers probably felt disembodied because their bodies did not exist in the virtual environment. Head movements were likely the only indicators for embodying a virtual self-presence that could move within, and interact with, the virtual environment.

The concept of presence as discussed by Lee in these three dimensions of the model differs from existing conceptualizations of 'presence' in Western classical concert settings. While Lee's model concentrates on the immediacy of the virtual experience, contingent on its believability and its modes of interactivity, presence in the literature on classical concert studies has tended to focus on the liveness and uniqueness of a specific event, as well as the sense of presence being a "sensorial and

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intense physical experience" (Wald-Fuhrmann et al., 2021, p. 9; drawing on Gumbrecht, 2004). Rebstock (2020) identifies a "crisis" in the production of presence in classical concerts, a need to elevate the 'eventfulness' of such performances in order to fulfill a desire for presence in a world saturated with digital media. Forms of presence that relate to the value placed on "being there" physically at a specific event (Radbourne, Johanson & Glow, 2014) come into conflict with presence in virtual environments as formulated by Lee, who further draws on definitions of full immersion as becoming dissociated from the real, physical environment (p. 3) – a very different mode of 'being there'. The Orpheus Reimagined concerts, through our use of the pass-through mode, can be conceived of as a compromise between these forms of presence: the audience members are not fully physically immersed in either the virtual or the live experience but it is perhaps through the combination of both that a unique concert experience emerges. As Onderdijk et al. (2023) note in their survey of attendees primarily of VR pop music concerts, the ability of XR technologies, whether fully virtual or mixed reality, to create new experiences that cannot be obtained elsewhere is important to users and attendees.

Lee's conceptualization of social presence, which centers on social relationships primarily with virtual intelligences poses further challenges in translation between the worlds of virtual gaming environments and classical concerts. Live music concerts are widely discussed as meaningful social experiences with the power to connect audience members and create a strong sense of togetherness among attendees and between attendees and performers (O'Neill & Egermann, 2022; Pitts, 2005; Pitts, 2014; Wald-Fuhrmann et al., 2021). Such experiences of co-presence and connection are often cited as motivators for live music attendance (Mulder & Hitters, 2023; Onderdijk et al., 2023; Pitts, 2014). In the context of XR concerts such as the Orpheus Reimagined format, we have a complex social web of virtual and real 'intelligences' that are perceived through various senses. Social interactions that take place within the virtual environment are further embedded in the larger social context of the concert. It is possible that a more immersive virtual environment, with greater social presence from virtual characters or intelligences, would in fact have a negative impact on the live social experience or 'presence'. The basic act of wearing a VR headset in the concert situation potentially creates a more individualized experience, thus conflicting with possible social motivations for concert attendance.

Involvement

Involvement is defined by Lee as "[t]he sense of deep cognitive and behavioral engagement with a narrative and/or a task" (p. 7). The Orpheus Reimagined concertgoers had no concrete task and whether they sensed a deep cognitive engagement with the story of Orpheus depended on how familiar they were with the plot and whether they were able to connect it to the visuals of the virtual environment.
Considering how to apply Lee's criterion of involvement to the context of concerts of Western art music means confronting traditional notions of the 'aims' of a concert and the role of audience members. Western art music is a "presentational" musical culture (Turino, 2008, p. 52), in which there is typically a clear distinction between artists and audience members and active participation or even spontaneous response on the part of audience members is not usually expected. Creating participatory dynamics or engaging audience members in specific 'tasks' in classical concert settings still remains rare. In audience research and concert studies literature, contradictory definitions of the relationship between involvement or participation and immersion emerge. As Wald-Fuhrmann et al. (2021) describe, the "frame" or situation of the concert has been conceived of as offering some audience members the conditions for "an undisturbed, attentive, even immersive listening experience in a specific time-frame", yet the behavioral restrictions (sitting still in silence, suppression of spontaneous responses) that make this form of listening possible also may at times hinder other audience members less familiar with such conventions from being able to connect with the experience (p. 6). Immersion has therefore been conceptualized as either undisturbed contemplation or as greater involvement, and research on participatory concerts brings out further insights into the push and pull between these two poles. In their study of newly commissioned works for audience members and professional ensembles, Toelle and Sloboda's (2019) audience-participants reported feeling a sense of community with the musicians and other performers and of "immersivity" (p. 13) in the musical work through their active participation. However, they also note that audience members felt at times as if their participation distracted from being able to fully take in the piece (p. 17). In a case study of a participatory installation in the field of experimental music, Emerson (2023,

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p. 134–152) discusses similar gains and losses reported by audience-participants: on the one hand, audience members who participated actively in the installation reported more memorable and satisfying experiences than those who simply observed, but on the other hand, there were frustrations with the amount of agency afforded by the format (not enough for some, yet intimidating for others) and less of a sense of being able to take in the 'whole' work. In the context of live classical music, involvement or participation can therefore not be adopted as readily as a criterion for immersion, as Lee proposes.

Properties of the immersive system

When applying Lee's three technical properties of an "Immersive System and Content" – plausibility, interactivity, and interestingness – to the Orpheus Reimagined format, it becomes clear that their relevance and weighting need to be adapted to the artistic priorities of the project. Lee's model addresses immersive experiences in a general sense, often with the implicit aim of creating a believable and internally consistent virtual world. The artistic approach of the project deliberately diverged from this. Plausibility, in the sense of seamless integration between the virtual and the real, was not a primary goal but was intentionally disrupted. The visual design – a stylized cave environment in pass-through mode, in which the musicians appeared only in the 'cave opening', rendered monochrome and at proportions differing from the physical reality – created a deliberate visual and spatial dissonance. This interplay between the virtual setting and the physical concert hall was intended to unsettle notions of space, reality, and narrative, while at the same time accentuating the liveness of the event.

Similarly, interactivity was shaped less by direct or task-oriented engagement, as might be implied by Lee's framework, and more by the traditional modes of reception in classical concerts. The primary form of 'interaction' involved head movement and the act of turning or looking around to perceive visual and acoustic stimuli from different directions. Optional hand-tracking elements, such as "pushing away" ghost figures, were available for more active audience members, but they were not essential to experiencing the work. The intention here was to gently disrupt the habitual, front-facing orientation of classical concert listening and to stimulate a more active, spatially open mode of perception.

Interestingness – "the quality of an immersive system or content that captures a user's attention, curiosity or motivation" (Lee, p. 7) – proved to be a more ambivalent category. For some audience members, the attraction lay in the technological novelty and unpredictability of the format, especially given that this combination of live concert, XR technology, and selective pass-through is very uncommon in the classical domain. For others, however, the visual and interactive elements risked being perceived as a distraction from the musical core, or as undermining expectations of a 'traditional' concert experience.

Summary and Conclusion

Applying Lee's model of immersion to XR concerts of Western classical music presents a number of challenges. Lee's definition of 'presence', with its dimensions of physical, social and self-presence in the virtual, contrasts definitions from existing concert research, which center on the uniqueness of the live experience and the social experience of the concert situation. The dimension of involvement from Lee's model comes into conflict with the presentational nature of Western art music culture, which traditionally does not involve direct participation from audience members. While involvement in Lee's sense could enrich the audience experience, as empirical concert research suggests, it also comes up against understandings of the classical concert experience as contemplative or as a space for differently 'immersive' undisturbed listening. On a technical level, Lee's properties of the immersive system offer valuable points of reference. However, their weighting and technical implementation require adaptation for classical concert contexts: plausibility may be deliberately subverted as an artistic device, interactivity may be reduced to subtle bodily and attention-based engagement, and interestingness may arise from both aesthetic and technological dimensions.

A question that remains is what a truly *immersive* concert would look like. If immersion were defined according to Lee's dimensions, the result would be very different from a conventional concert of Western classical music and potentially, for some, not desirably so; this represents the slight futility of merging these formats and discourses. However, there is much to be gained from rethinking and widening conceptualizations of what the classical concert experience can be and how it can speak to a broader range of potential audience members. As theatre and performance art scholar Claire Bishop has observed, performance and how we perceive it today is shaped by newer, digitally-informed ways of socializ-

ing and paying attention (Bishop, 2024). She proposes that the future of contemporary performance could lie in formats that allow for flexible, pluralized modes of paying attention (or for "hybrid attention", Bishop, 2024, p. 46). Formats that hybridize or expand the live format through digital media, such as the Orpheus Reimagined concerts, could be a particularly productive cross section at which to be reconfiguring the classical concert. These efforts will need, as we have demonstrated, equally hybridized definitions of terms such as immersion and presence that are able to mediate between the live and the virtual and between tradition and innovation.[1]

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Note

[1] Mats B. Küssner and Gina Emerson contributed equally to this work.