Half-real worlds? Immersion and the representation of musical pasts in virtual reality

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Abstract:

To speak of a musical past is to engage in a challenging, but creatively stimulating, process of recovery of complex and ephemeral phenomena. The possibilities are so tantalising that we cannot help but do this. This is far from a new problem. For late-medieval readers, the book was a transportative medium for the mind, slingshotting the reader into another time and place, with each page laden with encoded symbolic and paratextual relationships. Rather than being seen simply as 'flat' media lacking the interactivity of modern interfaces, such documents may provide a template for understanding transhistorical readings of spaces that straddle fact and fiction. We might therefore provocatively consider whether a modern viewer/participant using a headset and/or other virtual reality (VR) hardware has a significantly different experience to that of a reader several centuries ago. This chapter explores concepts of immersion to demonstrate how VR constitutes an emergent musico-historical visual culture in its own right, proposing that an expanded form of the rhetorical concept of *ductus* may offer a productive frame of reference.

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To speak of a musical past is to engage in a challenging, but creatively stimulating, process of recovering complex and ephemeral phenomena whilst negotiating multiple lenses of reception history. The possibilities are so tantalising that we cannot help but do this. We think not only about the sound as it might have been heard (or as we might expect or want it to be heard) but try to *re*create something beyond this – a 'text' (that which sustains the historic listening experience) that addresses both the sonic and social, and maybe more. This is, arguably, a necessity if we are to engage with inherently ephemeral sonic experiences of historic music. For much of human history, we have no recordings made *in situ* that capture specific performance practices. Even where we do, there is a great deal not captured in a recording, not least those social and experiential aspects of the production of sound and music. As James Cook's chapter in this volume shows, many of the spaces where historic music would have been heard originally are now in ruinous states and distant shells of their former lives.

A 'text', with all its stereographic pluralities (Barthes, 1977, p. 155), offers a site where imagination (both individual and collective) and documentary evidence intersect to occupy negotiated spaces that straddle fact and fiction. But this is far from a modern problem; throughout the ages, humans have used signs and representational media to recall, reconnect, possibly even relive, moments in time, whether experienced first-hand, imagined, or drawing from a collective memorial archive. The media through which this happens have changed markedly in many ways, and yet there are elements which have persisted over time. New technological developments supposedly offer possibilities purportedly to enhance these representational experiences to make them more *immersive* for a user, reader, or audience member. However, as Kirkman and Weller demonstrate in their discussions of Julian of Norwich (1343 – after 1416), revelatory contemplation of a sculpture and medieval

devotional experiences could be vividly immersive without the aid of digital technology. Julian of Norwich describes it thus:

> ‘I saw His swete face as it was drye and blodeles with pale deyeng, and sithen more pale, dede, langoring, and than turned more dede into blew, and sithen more browne blew, and the flesh turnyd more depe dede.’ (Avray, 2008, p. 87)

Such accounts serve to complicate the relationship between technological power and the perceived possibilities of vivid immersion, a challenging term which is explored more fully later. However, it is clear that increased technological power can offer the potential for highly photorealistic and auditory sensory stimuli which could, in theory at least, align with modernity’s aspirations towards historical verisimilitude. And yet, though such possibilities do exist, these developments may move beyond the merely historical towards something like fantasy; after all, gaps in the historical record far exceed that which is taken as commonly understood historical fact. Somewhat counterintuitively, the greater the possibilities of available media palettes, the more striking and tangible the lack of detail is in auditory and musical history. Verisimilitude becomes ever-more challenging because there is a requirement to make concrete what could be left to a reader or user imagination, a tension that is central to Hayden White’s discussion of historiography and historiophoty (1988). John Haines outlines an illustrative example by asking, ‘How can we ever know…exactly how the bell sounded in the specific time and place evoked?…[C]ountless details would be needed that can never be recovered’ (2014, pp. 2–3). As new media forms offer us the opportunity to experience the Haines’ hypothetical bell in a different way, these missing details will need to be filled in to maintain verisimilitude.

The medieval precedent for virtual reality

As a starting point, we might provocatively ask whether a modern viewer/participant wearing a headset and/or other VR gear has a significantly different experience to that of a reader – by which we mean an individual engaging with a book – several centuries ago. What might pre-modern approaches to historical reimagination, free from the influence of screen-based media, tell us about cutting-edge approaches in virtual environments? For instance, Julian of Norwich's experience was undoubtedly immersive and sensorial, yet we would not normally consider a statue as 'immersive media'. Related to this question are the broader philosophical considerations surrounding perceptions of musical reality, the porous boundaries of hyper-reality and simulacra, what historical sound is, and its embedded codes of representation, all of which extend beyond but impinge directly upon representations of the musical past.

The prevalence and affordability of virtual reality (VR) has increased dramatically in recent years, facilitating its use across an ever-expanding range of settings and contexts, from healthcare to leisure. Visitors to historic attractions now regularly find a VR headset in the gift shop. Users can also explore virtual worlds, some modelled on real locations and others imagined, from the comfort and privacy of their own home. The affordability and processing power of products for home usage are increasing all the time. These range from devices which act as headset holders for cheap smartphones through to bespoke hardware with operating systems dedicated to VR applications. All of these technologies have now reached a point where instant obsolescence is less of a disincentive to purchase for the average user, as indicated by various valuations of the VR market as being worth tens of billions of dollars. As VR becomes ever-more ubiquitous in the media landscape – sales increased by 42% from 2021 to 2022, with a projected market value of $250 billion by 2028[1] – and begins to exert its influence on the media's reception and interpretation of history specifically, a closer consideration of the opportunities and issues this form has for recreating the musical past

needs to be undertaken. It cannot simply be treated as an extension of filmic and ludic frames of analysis, demanding instead its own interpretative frameworks. These new types of media experience pose challenging questions to our broader understandings of appreciating the musical past in media, but principally from the position of embodied user perspective, sonic-spatial identity, and the unification of audio and visual components.

Building history: simulation and the late-medieval multimedia book

Before addressing modern representational technologies and notions of immersion, it is important to consider how history could be experienced vividly in a pre-modern age. Channelling Baudrillard in Carney's 'American' translation of *simulacra*, 'yearning for the past is yearning for something that's not real. You don't even remember it correctly, so how the f*** can it be real?' (Carney, 2012, p. 99). Though admittedly a tongue-in-cheek reading, it foregrounds an important issue for this chapter; how can a representation of a musical past about which we know comparatively little be *real*? As James Cook's chapter shows, reconstructing a musical past where we have little surviving repertory is a particularly challenging endeavour, but one that offers an interesting site for reconstruction.[2]

Analogies for exploring representations of musical pasts can be found in historic reading modalities and textual experiences from the past. Eschewing present-day assumptions about the default modes of engaging with media, whether this be through a screen or as a reading process, enables us to approach VR in a different light. In this sense, turning to medieval thought offers a fresh way to think about phenomenological experience in the present and, I would argue, the future.

Reading practices in the Middle Ages have been the subject of much research, not only because of the fascination with surviving documents, but also because of the different ways

in which reading could be conceptualised. For example, Saenger's *Space Between Words* (1997), a seminal work on this subject, documents clearly the impacts that these modalities of reading had on the production of manuscripts themselves, moving from phonetic syllabic chains into discrete word-block units. To be a reader in the modern sense means most likely engaging with a text silently; in the late Middle Ages, however, reading was a much more multifaceted process, moving between intensely private experiences and profoundly performative group encounters.[3] In a sense, text on the written page encompasses numerous creative activities, with multiple layers of textuality and materiality potentially in play at any one time. For late-medieval readers, the book, both as vehicle for text transmission and material object in its own right, was an intensely multimedia transportative tool for the mind, slingshotting the reader into another time and place. Each page could be laden with encoded symbolic relationships and para-texts which would be clear to a contemporary audience, but the subtleties of which elude modern readers. In effect, the medieval book had, and still has, the power to transform a sense of reality that cuts across historical time. As Laurel Amtower notes, the medieval book possessed important transhistorical properties for medieval readers:

> *'The [medieval] book transports the reader outside the body, becoming the "eyes and ears" into another time and place. Sacred events materialize in the present as the reader is transformed into a witness of the figurative reality beyond and learns to perceive contemporary occurrences through a transhistorical lens.'*
> (Amtower, 2000, p. 42)

Thus, medieval books have the potential to transform a sense of reality that cuts across historical time. Note Amtower's emphasis on the 'book' rather than the 'text'; the materiality of the object to which a reader is connected, through the hands, eyes, and mind, is important. It is not just the textual contents or ideas. In a pre-screen age, physical connection, and enactment, of texts and stories turned reading into a process that blurred the boundaries

between reality and the fictional world. The book created a figurative reality that allowed a reader to traverse the porous boundaries between historical spaces, contemporary reality, and fictive worlds, with a flexible interplay of borders uncommon in the modern world.

Take, for example, the case of *Arcadia* (1480, first published 1504) by the Neapolitan poet Jacapo Sannazaro (1458–1530). Through its combination of prose and verse, a common textual feature of the period, it traverses the boundaries between reality and fictional worlds as a form of escape from the cultural decline of the Neapolitan court. Sincero, a quasi-autobiographical characterisation of Sannazaro himself, retreats from the city of Naples to pursue an idealised pastoral existence in Arcadia. The poet is driven to return to the city through a dark tunnel following a traumatic dream where he learns of the death of his beloved. *Arcadia* features fictionalised versions of real Neapolitan courtiers, who would have been well-known in Sannazaro's circles and by most of his intended readership. For example, the shepherds Barcinio and Summonio are the Spanish poet and singer, Cariteo (c. 1450–1515) and Neapolitan humanist, Pietro Summonte (1463–1526), respectively. These characters even mourn their friend Melibeo, a fictionalised Giovanni Pontano (1426–1503), esteemed humanist and diplomat and founding figure of the Neapolitan Accademia Pontaniana (Gerbino, 2009, pp. 48–49). Sannazzaro's *Arcadia* is a half-real world featuring the demise of some of the greatest cultural figures of the ages. It is a real past inflected through a fictive reality that straddles both past and present (for contemporary readers). Reading it today, some hundreds of years later, we are thus able to, reflect on a real past through a transhistorical account.

This is a distinctly 'low-tech' iteration of media which brings forth transhistorical ideas to the presence of the reader (and vice versa) in a transportative sense. It forms intriguing paratextual relationships between the written word and contemporary reality, not least through its parallelisms between historic and contemporaneous cultural decline. It is

incumbent on the reader to make a series of decisions, informed or otherwise, in the creation of their historical landscape. The individuality of such an approach, which could be highly immersive and transportative, affords the possibilities of moving towards something closer to fantasy.

In the case of Sannazaro's *Arcadia*, the text is a social script to enable the Neapolitan courtiers to inhabit a half-real space, self-fashioning in the real world as a character from the fictional world, blurring the boundaries between a classicised fictional Arcadian landscape and the real Neapolitan court. However, this type of immersion is achieved without the need of a piece of equipment that physically blocks out the world around us in the way that a modern VR headset does. Having established the above, we are now in a position to consider how these notions impinge on our thinking about the role of sound in historical virtual reality, and what we may be able to learn from medieval conceptualisations of memory, representation, and the intrinsic logics of artistic and media forms.

Elusive immersion

Nearly 20 years ago, when VR and AR were still very much the property of university labs and science-fiction films, scholars were already noting that immersion had 'become an excessively vague, all-inclusive concept' (McMahan, 2003, p. 67) that was in need of careful reconsideration. Janet Murray, in her classic *Hamlet on the Holodeck* from just a few years prior, describes immersion in terms that demonstrate McMahan's characterisation of excessive vagueness. She defines it as the 'experience of being transported to an elaborately simulated place', the result of which is the 'sensation of being surrounded by a completely other reality, as different as water is from air, that takes over all of our attention, our whole perceptual apparatus' (Murray, 1997, p. 98).

In relation to videogames, Laura Emri and Frans Mäyrä break this down a little further, delineating three overlapping types of immersion: sensory, challenge-based, and imaginative (2005, p. 7). We might argue that something approaching Emri and Mäyrä's 'imaginative' immersion was experienced by medieval readers, either through their engagement with books of hours and objects of the kind that Amtower describes above, or in living a quasi-fictive Arcadian idyll by reading Sannazaro's *Arcadia*. The mind undertakes the imaginative leap required to make this happen – in other words, the present is taken over by the imagined, but not to the point of exclusion or obliteration. In the case of medieval books, this process is more complex, both because of the physical objects themselves and the intertextual allusions that have the potential to enrich the reader's sensory and imagined experience in different ways. The text at hand guides the individual's construction of this transhistorical and/or fictive reality, but it nevertheless remains incomplete. Jesper Juul describes videogames in much the same way: 'all fictional worlds are *incomplete* […] Any fictional world will be missing…pieces of information, some of which will be filled in by the user, some of which will remain subject to controversy' (2005, p. 122). Hayden White's classic discussion of historiophoty is similarly focused on the apparent concreteness demanded by visual images where decisions have to be made about the smallest of details (White, 1988). Despite looking at different media, the conceptual issues identified in both Juul's analysis of videogames and White's discussion of documentary film pertain precisely to virtual environments; how does one 'fill in' the details required to create the virtual model?

In many VR creations, a significant amount of the imaginative legwork is done for a user, but in a different way, I would argue, from other traditional representational media. Even though there is a sense that VR users have increased opportunity to engage with a fictive reality (or elements of this) in their own way, much of the creative decision-making is skewed to an even greater extent towards the creator of the VR environment. Somewhat

contradictorily, the need to account for multiple eventualities opens up new possibilities for sensory immersion, and these are held in tension with the need to take many creative and imaginative decisions on the user's behalf. A user may well be able to move around a space and take control over their engagement with a virtual world, possibly with the potential to intensify emotional reactions and approach a sense of 'embodiment' (Gall et al., 2021). However, the planning for such interactivity requires the content creators to make decisions around the parameters and limitations of their ideas. Many of the details which are the subject of controversy are 'filled in' for the sake of unification.

Through this type of process, fictional play worlds are established where both the past and our own present are up for grabs. Such a dialogic and interactive process, where the boundaries between these temporal frames collapse creatively into each other, recalls the essence of fictive play worlds evidenced in fifteenth-century narratives. The literary and media theorist Hans Ulrich Gumbrecht explores this idea in relation to fifteenth-century cancioneros, noting that they offer a window into another world based entirely on collective imagination (Gumbrecht, 1991). This is a communal version of the picture of the book as a transportative medium presented by Laurel Amtower, and it is illustrative of how other worlds could be created socially and to facilitate imaginative immersion. In a sense, this draws attention to the importance of the liminal spaces between the real and fictive/virtual worlds, with the shifts between these realms being more flexible than the oppositionality of *real* and *virtual* might at first suggest.

Despite its seemingly slippery terminological nature, immersion clearly centres on the interactions between audiovisual phenomena and their ability to change perceptions of, perhaps even obscure, the real world to some extent. As such, sound has a potentially significant role to play in establishing and maintaining 'presence' within a fictive world, which Slater describes as a 'human reaction to immersion' (2003, p. 2). Whilst digital media

are often discussed in primarily visual terms, the audio-visual relationship is fundamental to transporting a user into the virtual realm, even if that does mean suspending a sense of verisimilitude. Tom Garner describes it in exactly these terms: 'the fundamental immersive quality of… VR is audiovisual, requiring both graphics and sound to not only be present, but deeply interconnected to present a unified experience' (2018, p. 93). Such a recognition is not new, with Penelope Sweetser and Peta Wyeth noting the importance of sound in maintaining sensory immersion for the duration of playing digital games (2005). Sweetser and Wyeth's use of 'sensory immersion' here can clearly extend to immersion more widely. Stephen Tatlow's chapter in this volume discusses the technical considerations behind this in much greater detail. For the present chapter, however, it is sufficient to state that there is significant evidence for the importance of sound within a VR environment, both to draw the 'user into the virtual world' (Sweetser and Wyeth, 2005) and to maintain the conditions for imaginative and sensory immersion.

The virtual (musical) past?

Much of the earlier literature on VR placed 'the virtual in opposition to reality' (Garner 2018, p. 35), with the concepts of *real* and *virtual* being the subject of significant bifurcation. This is typified by an early mapping proposed by Milgram et al. (1994), which places the real and virtual as opposing polarities, with augmented reality / augmented virtuality serving as broad intermediate categories between these.

Whilst the simplicity of placing the *real* and *virtual* at opposing ends of this continuum has an appealing simplicity, the blurring of lines between reality and virtuality in engaging with musical pasts means that such a model is not adequate here. As Garner observes, 'An imaginary entity that inspires change in the physical environment is powerfully

real. Equally so, the virtual does not merely accompany the actual, it determines its precise form and launches it into actuality. It is also, powerfully real' (2018, pp. 36–37). If the *virtual* is powerfully *real*, this reinforces something that I noted with James Cook and Alexander Kolassa back in 2018 – namely, that 'investigations of this sort are about how the present rewrites the past […] and how the present itself is rewritten through […] creative dialogue with that past' (Cook et al., 2018, pp. 1–14). The case is similar for AR environments, where a real physical and spatial environment is augmented and becomes something new and arguably no less real. The real and present-day space is redefined and remade through its engagement with the past.

To frame this claim, a small vignette is helpful. In 2018, I was fortunate to test a prototype of the Linlithgow VR reconstruction.[4] Whilst Cook's chapter focuses on the technical and scholarly decisions that went into this particular reconstruction in visual and aural terms, as a strand of affective medievalism, this analysis considers the implications of such approaches on the experience of medieval music in a virtual reality environment.

Vignette – reconstructing Linlithgow chapel in VR

> *Imagine for a moment that we, as hypothetical users, are wearing a VR headset and that we are standing in a digital rendering of a historical space: Linlithgow Palace. The experience begins with some drone footage from the annual jousting event, itself a medievalist trope, showing the palace. This is accompanied by a voiceover which offers information on the date of the reconstructed model and outlines its grounding in scientific and historical reasoning. In the present day, the space is ruinous, lacking a roof, soft furnishings, and some of its internal structure; in the VR environment it is a lavish recreation of a chapel which, though modest in size, benefitted from royal status. As we move into the VR model itself, we see ghostly avatars of singers and hear singing repertory that sounds quite different from modern day music. There are two versions of the chapel, one as it stands today and one with period decoration. The acoustic properties of the sounds reflect the scale of the space we see, and we are transported to another time and place. Surround sound audio helps to establish the size and scale of the reconstructed environment, addressed both visually and musically. Even if there are elements that we might expect to see (and hear), there are some significant differences, and it leaves a user with some questions.*
>
> *What are the rules for being in this virtual space? How are we supposed to experience it? Where should we stand? Where should we look? How is the music to be perceived? How much space should we give the avatars? Even though the experience has been framed to some extent, there is no clear guiding narrative, any linear thread in the VR model itself, nor socialised norms to follow in this environment. We are given significant agency to make this our own. We hear sounds, music, and this may well be 'early' music, but what does this do for our sense of where and (perhaps most pressingly) 'when' we are? How does what we see and hear accord with what we would expect to see in a historical environment of this time?*

The questions posed above draw attention to some of the emergent problems that a virtual recreation of a historical space, both in visual aesthetic and sonic aura, presents. In this case, the VR headset and technology reconstructs a pre-ruinous Linlithgow Palace in a virtual environment. It creates an impossible space. Whilst there are a few inevitable quirks of this, such as your inability to see your own feet (which can lead to some balance issues), it is possible to experience the sense of momentarily losing oneself in an imagined space. The reconstructive work in the virtual space, such as adding a roof, carpets/tiles, plaster, roaring fires, requires a few imaginative and informed leaps, but it provides a detailed framework to engage musically. This unification of sound and image is clearly important in a VR environment (Garner, 2018, p. 93), particularly one which puts such significant weight on its

attempts at aural veracity. Such unification requires a reference point for a user, and this undoubtedly falls back on codes and signs which have been established through a multitude of media, most prominently filmic, in evoking the sense and sound of the medieval past. The appropriateness of any musical choice is mediated through such codes. In this case, however, it is also grounded in historically informed approaches, blending a mix of documentary evidence, architectural reconstruction, reportorial knowledge, educated guesswork and a few interpretative leaps, to reconstruct, perhaps even recompose, a musical past.

The experience of the Linlithgow VR model may well be quite disconcerting for a user who has different kinds of expectations of what the medieval past sounded like. Based on assumptions grounded in film, TV and videogames, a user may well anticipate something like pseudo-plainchant or even something with instruments (most likely an organ), perhaps more closely aligned with Baroque styles at that. The distinction from the expectations of these codes may well emphasise the alterity and apparent strangeness of this environment.

Thus, what we have in this instance is half-real; i.e., a reconstruction that straddles both the observable and imaginative. LIDAR (laser imaging, detection, and ranging) scans provide a close-to-real model for the acoustic properties; musical decisions are made based on close reading of available sources and performing conventions. These components come from two different epistemological foundations, and yet they are fused creatively here. Taken in combination, they have the potential to change our perceptions of the sonic properties of a space, the musical realities of the past, and to counteract the overwhelming state of ruination that influences appreciation of the standing building. However, layered onto these foundations are the possible ways in which a user interacts with a VR environment, and how these agentic elements affect the experience and extent of immersion.

If we are experiencing a recreation of a musical performance, we have the potential to explore the virtual world in several ways. For example, we may be quite passive, simply using sound as a means to locate ourselves within a three-dimensional space. Even with poor quality graphics, we would be able to evoke a sense of the spatiality of our environment through its acoustic properties alone. Indeed, many definitions of virtuality do not actually refer specifically to visual elements (Garner, 2018, p. 93). We may act according to the norms that we associate with certain spaces in the real world. For example, if we enter a concert hall, we would normally take our seat and wait patiently for the house lights to dim before the performance to starts, remaining content for the world beyond this arena to disappear from our minds. Equally, upon entering a sacred space, we might choose to sit on pews in reverent silence and expectation, respecting the norms to which we have become accustomed, even if these do not accord with the ways in which medieval sacred spaces were arranged.[5] These ideas about the rules of engagement are most likely the default position of many users. The relative unfamiliarity of VR, and the individuality of the experience, may well serve to break down some of these behavioural expectations; certainly, it offers a new way of listening to music unfamiliar to many, one that is arguably essential to the experiential and experimental medium of VR.[6]

For instance, we might be more radical and take the opportunity to stand very close to the represented performers, thereby skewing our sense of audio perspective – something we would probably never do if real performers were involved. Standing right in the centre of the group of singers certainly offers a new way of listening to this music. We might also turn away from the group to admire some of the architectural details and decorations and pay little direct attention to the music being heard, rendering the music as little more than a soundtrack to deprive us of sensing the outside world. These possibilities, two amongst many, demonstrate that VR certainly creates some novel listening possibilities. However, they draw

attention to the inadequacy of viewing the virtual and real as polar opposites, particularly in a historical environment where the boundaries between fact, critically-informed judgement, and leaps of invention are not always clear. Instead, a different kind of framework is needed to investigate historical sound in virtual environments, one which permits more flexible examination of blurred boundaries between fact, invention, and fragmentary reconstruction. Expert judgement, inferences based upon contemporary sources, art historical evidence, and all manner of other witnesses to historical musical practice arrive in the cultural melting pot that is our perception of this historic musical space. Such an approach and mode of listening is one that may be essential to the experiential and experimental medium of VR.

An old model for understanding new technology

The elements of flexibility that VR introduces has strong parallels with the porous boundaries between text and reality in the medieval world. This is somewhat analogous to the notion of metalepsis, a concept applied by Hofer (2011) to describe the liminal spaces between the real and virtual realms. As noted earlier, medieval readers were perfectly comfortable with porous boundaries between the fictive and real world. Indeed, such permeability between the real and imagined, the present and memory, was enjoyed by many, certainly in courtly circles. This played an important part in conceptualising the enhancement of the memory of ideas, places, and histories.

Mary Carruthers' work on medieval memory, memorisation practices, and their relationship to ancient traditions of *memoria*, has been central to understanding this as both phenomenon and process.[7] Whilst the present discussion is not about medieval memorisation, its foundational concepts have relevance here, especially those which discuss the creation of images, and the act of engaging with these, not necessarily based in reality, as a means of

storing and connecting information. One such concept is *ductus*, which can be thought of as the way by which a work leads someone through itself – i.e., that quality in a work's formal patterns which engages a viewer, auditor or performer and sets them in motion within its structures, an experience more like travelling through stages along a route rather than like perceiving a whole object (Carruthers, 2010, p. 190).

Ductus is quite specific in its function as an organising principle that directs a journey *through* a work of art. Carruthers offers the following description:

> *'…ductus* is a principle of movement not stasis, or process rather than product, the con*duct* of a thinking, listening and feeling mind on its *way* through a composition' (Carruthers, 2010), p. 196).

The notion of *ductus*, as summarised by Carruthers, then, supposes the experience of art (including visual and sonic stimuli) in terms of a journey, as something virtual and experienced, even lived and felt. It is primarily a mental process, combining sights, sounds and imagination. The result can be charted like a map, in space and time. Such a model prefigures our VR experiment in the experienced past in interesting ways. It may even, effectively, link our experience to that of the past itself. As a reader, or user, we can follow the formal structures as a guide but also have the flexibility to make individual decisions, forging a distinctive route for ourselves by interacting with different aspects of a work of art. We can choose, for example, to turn our attention to a specific point, linger on it for as long as we like, and then turn to a different focal point. This is an opportunity to think, listen and feel our way through a composition. Recalling our earlier discussion of immersion, Winifred Philips makes a direct connection between agency and immersive experience requiring 'the participant to receive compelling sensory information about the simulated environment, take action and cause reactions within that space' (Philips, 2014, p. 38). Thus, the principles of

ductus are ideally suited to take account of this type of experience, receiving compelling sensory information (whether real or imagined) and having agency over the precise interactions.

Indeed, related to *ductus* is the sub-concept of *modus*, which refers to variations within the work of art. This relationship is key because it facilitates an understanding of a transportative world in which the user/reader/audience has the agency to take decisions about their journey an artistic space, operationalised within a space (Carruthers, 2010, p. 196). In this instance, the virtual world of Linlithgow Palace requires such a way of thinking, both at the macro level of overall experience and at the micro-level of user interaction, which is impossible to predict fully.

Ductus and Linlithgow Palace

Such indeterminacy places music in a different position to conventional filmic models. In the case of the Linlithgow Palace reconstruction, the music is both a signifier of cultural history and a literal marker for navigation in an explorable space. Whilst we can orient the view through our headset to get a sense of the spatialisation, the perception of scale and material properties is manifested powerfully through the resonance that the music brings. In the case of this model, such a spatialisation is doubly heightened because a significant emphasis is placed on its musico-historical veracity. By the time the music is heard, the user has already been primed into thinking that this is the repertoire which would have been sung in such a space in the late Middle Ages.

The explicit presentation in this way offers a different kind of semantic weight. Though the framing of the recording in the VR space is as something ‘real’, it also operates much like a commercial recording for private listening; it foregrounds the music, edits out

breathing and does not incorporate a wider soundscape, focusing attention on the music alone.[8] The virtual space has little else in terms of moving objects save for the singers, which are themselves ghostly figures, meaning that the attention is focused very much on the source of sound. The user's movements are not matched with the sounds of footsteps (most likely due to a limitation in the technology or scope of the project) or other kinds of haptic feedback[9], nor is there a visual representation of a hypothetical user body, though the latter's aural perspective changes significantly as they navigate the space. Whilst this might be seen to reduce the sense of feedback a user gets within a virtual space, and thus reduces the sense that the environment conforms to what would be expected in a real space, there is clear scope here for the participant to receive 'compelling sensory information' through 'archetypal symbolic content encountered inside the virtual world' (Philips, 2014, p. 38). Such an approach, as Gall et al. note, can induce a sense of ownership over a virtual body that contributes to the illusion of 'virtual embodiment' which can, in turn, enhance illusory spatial perception (2021, p. 2).

[INSERT FIGURE 1 HERE with caption

Figure 1 - Linlithgow Palace model with decoration, furnishings and an altar, along with avatars singing from a choirbook.]

In presenting the chapel interior with colourful decoration (

Figure 1), an altarpiece and heraldic symbols, the visual identity of Linlithgow Palace is transformed from ruination to a more dynamic space. The singing semi-transparent avatars are arranged in a semi-circle, facing the altar, altarpiece and an open folio of the manuscript Edinburgh, National Library of Scotland, MS Adv. 5.1.15, better known as the 'Carver Choirbook'.[10] This arrangement is significant because it inverts the expectation of an audience-facing performance presentation whilst still allowing users to visually orient the source of the sounds. The atmosphere is quite introspective and sombre, and a user may feel

as though they are peering into a private space, connecting with commonly held perceptions of religious sobriety of medieval sacred events. The Linlithgow model also enables users to switch quickly to experience something more akin to the present state of the building in virtual reality (
Figure 2), with exposed stonework and the current floor being visible, as well as singing avatars layered on top. This means that a user can transition freely between the past and present, with music serving as the constant across this time. The visuals and acoustics change to match the different historical states of this space, but the singing continues across this virtual temporal transition.

The analogies to medieval texts – i.e. in which the boundaries between contemporary reality and fictive play worlds became easily blurred – are clear. Indeed, in this instance, the boundary between the virtual world and reality is also traversable. The user can move from a reconstruction of the chapel as it would likely have been seen in the early sixteenth century to a model which more closely reflects its current state. Throughout these, the consistent feature is the presence of a group of five singers, all singing from a single choirbook placed in the position where we might expect to find an altar. The model serves as a transportative medium that can easily slingshot a user between different historical spaces, with music serving as a constant. The sight and sound of music, though presented in different interiors, remains an important evocation of the space and time. This is important because it establishes the audiovisual imprint of historical music performance in an historic space. In a sense, this is all the more significant through the proximity of the VR model to the standing Linlithgow site and the way it is intended to enhance a visitor experience.

[INSERT FIGURE 2 HERE with caption

Figure 2 - Linlithgow Palace model with exposed stonework, avatars singing from a choirbook, and without an altar.]

Considering this in terms of *ductus*, there is a clear sense of visual and aural hierarchy, even within this largely indeterminate space. At the outset, a user's eyes are highly likely to be drawn to the altar as a focal point, making this the likely origin for a journey through the virtual world. This is the main track for appreciating the work in these terms. From this point on, the *ductus* is augmented with different strands of *modus*, best understood as variations along the way towards an end goal. The notion of *modus* allows us to account for the possibilities of a user's decision to stop, look, and listen from a particular perspective; this enables them to appreciate different aspects of the virtual space and potentially experience imaginative immersion to enhance a sense of the 'place illusion', which Slater (2009) describes as the 'qualia of having a sensation of being in a real place' (p. 1).

The aural focus of this Linlithgow model raises a number of interesting possibilities about the unification of audio and visual components in the VR landscape, not least the extent to which this approach establishes an audio-visual imprint that is different from that which may have been encountered before. This is important because, in terms of *modus*, the user is able to adapt the virtual world to their own preferences, and for the 'outside' world to influence what takes place in this environment. There are multiple ways in which a user can look and listen within the context of the model, deftly switching between reconstructed and half-real virtual worlds. The user can experience the singing avatars in a simulated acoustic space in a visual environment that either closely resembles what they can experience in the real world, or one that is a reconstructed virtual space. This is important because it challenges notions of ruination of medieval spaces; furthermore, it also establishes a distinctly unique audio-visual imprint that is not bound to cinematic codes or narrative intentions.

The otherwise sparse nature of the model means that the multiple *modi* will all feature the accompanying music in some way, forging strong associations between the sights of a group of singers seemingly producing sound and the spatialisation it represents. The

differences between the two visual layers are similarly manifested aurally, meaning that a user can become intimately acquainted with the extent to which their perception of the musical past may be out of step with philological examination and reconstruction. *Ductus* is a means to understand this overarching experience; *modus* is the means through which we can begin to understand the implications of operationalising historic music in this kind of space.

The extent to which a user is immersed in either of these two configurations, whether it be that of

Figure 1 or

Figure 2, is impacted powerfully by the music that is part of the model. It is something of a contradiction that, though the framing of the experience is one that aspires towards historical accuracy, the recording itself is (like a CD) synthetic, with breathing edited out and the foregrounding of music as separated from a wider ambient soundscape. Music in a ceremonial setting would always result in additional ambient sound, such as the movement of those involved in the ceremony, the breathing of singers, noises from outside the space, through to the faint crackles of candles illuminating the space. In the virtual environment, it is through the music that we can best appreciate the totality of the aesthetic differences from the ruined building that stands today.

Towards a new medieval model

Notions of immersion, reality, and virtual reality are inherently slippery, eluding easy classification or analysis. The porous nature of these realms – mediated through combinations of hardware, software, cultural signifiers and user expectations – test the limits of modes of analysis which emerge principally from filmic origins. As the early part of this chapter has shown, pre-modern conceptualisations both of reading and of books as objects allowed

readers to engage with texts interactively in ways that modern readers would not initially understand. The flexibility of boundaries between real and fictive worlds spilled out into paratextual encounters that transported readers to virtual spaces, and did so without the mediation of a headset (or associated immersive technologies of New Media). In a sense, imaginative immersion was hardwired into medieval texts, with what are perceived to be 'static' symbols and signifiers in the modern world being entirely multimedia in the medieval world. The concept of *ductus*, journeying through a work of art – whether this be a sculpture or a virtual reconstructed space – has powerful relevance in this new media environment, enabling a consideration of the unification of audio-visual materials in the recomposition of the musical past. Thus, the essentially experiential modality of medieval engagement is a genuine precursor to the aspirations of VR projects. There is the sense of directionality in an experience; importantly, though, the precise path taken is down to user choice, exactly as in a VR environment.

In the case of the VR reconstruction of Linlithgow Palace, we see music playing a central role in evoking a sense of historic time and emphasising the acoustic spatialisation of a now-ruined environment. This is important because the audio-visual experience is focused on locating a user within a virtual space, transcending ideas of representation or of evocation. A half-real world is established, taking real locations and acoustic properties overlaid with historically-grounded figurative virtuality. This is doubly significant due to the flexibility with which a user can move between a virtual rendering of the chapel as it stands today and a reconstruction of the historic site in its former glory. Whilst the visual differences are immediately apparent, the aural differences (which may take a little bit of time for a user to appreciate fully) offer an opportunity to challenge notions that medieval sacred music was heard in bare and cavernous acoustic environments.[11] Considering this user experience of this virtual medieval world through the lens of *ductus* offers the opportunity to shed new light on

the ways in which user agency and imaginative immersion come together in ways that have fascinating points of overlap with those of medieval readers. Thinking about new technologies in old ways is instructive in considering transhistorical sound in virtual reality. Adopting some of this terminology can, perhaps, help offer novel perspectives on new media approaches to representing the musical past.

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[1] See, for example, https://www.theguardian.com/games/2022/mar/31/covid-pushes-uk-video-games-market-to-record-7bn-but-games-sales-fall, https://www.statista.com/statistics/653390/worldwide-virtual-and-augmented-reality-headset-shipments/, and https://www.statista.com/statistics/591181/global-augmented-virtual-reality-market-size/.

[2] This is particularly true of the sounds of the late Middle Ages, about which a mainstream audience is likely to know little beyond impressions established through filmic media, falling broadly into monophonic chant in sacred spaces or a selection of thin and 'buzzy' instruments in secular settings. On the delineation of filmic spaces in this way, see Whittaker (2018).

[3] For a useful outline of key developments in reading practices over the age, see Manguel (1996).

[4] On the construction of the model itself, see https://www.ed.ac.uk/impact/research/culture-creativity/revived-with-the-sound-of-music.

[5] The 'Experience of Worship' project addressed similar questions and used processes of enactment to explore these: http://www.experienceofworship.org.uk/enactments/introduction/ (accessed 26 July 2022).

[6] Such a possibility can expose the limitations of simulated acoustic environments, especially those that rely on binaural solutions. See Stephen Tatlow's contribution to this volume for a discussion of issues relating to near-field spatialisation.

[7] Carruthers' work draws heavily on ancient rhetorical texts. The *Rhetorica ad Herennium* (c. 90 BCE) notes the value in images adhering in the mind: 'we ought to set up images of a kind that can adhere longest in the memory, and we shall do so if we establish images as striking as possible…The things we easily remember when they are real we likewise remember without difficulty when they are figments.' (*Rhetorica ad Herennium*, trans. Dyer, 2019, p. 25) 'Imagines igitur nos in eo genere constituere oportebit, quod genus in memoria diutissime potest haerere. Id accidet, si quam maxime notatas similitudines constituemus'. https://www.laits.utexas.edu/memoria/Ad_Herennium_Passages.html Translation from Dyer (2019). For a recent recontextualization of the *Rhetorica ad Herennium*, see Hilder (2015).

[8] The subject of additional noise in sound recordings has been the subject of much discussion. See, for example, Eliot Bates (2004, pp. 283–284).

[9] This absence of haptic feedback might be seen to further enhance the validity of *ductus* which is predominantly an approach which does not presuppose touch-based feedback directly through an interface.

[10] For a full catalogue entry, see https://www.diamm.ac.uk/sources/1757/#/ (accessed 26 July 2022).

[11] Owen Rees explores these issues in relation to recordings of Tomás Luis de Victoria's 1603 *Requiem* being presented as reconstructions, despite their having been recorded in cavernous acoustic spaces quite different from those contemporary with the recording commercially available recordings (2019, pp. 117–227).