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The Rough Mile: Testing a Framework of Immersive Practice

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ABSTRACT

We present our case study on gifting digital music, *The Rough Mile*, as an example of a Framework of Immersive Practice, intended for researchers and practitioners in HCI and interaction design. Although immersion is a frequently used term in the HCI and related literatures, we find no definitions or frameworks that are robust enough to capture the full range of multi-sensory, emotional, and cognitive engagement that the richest of these experiences can entail. We therefore turn to the theatrical performance literature to distil a theory-based framework of practices that can apply to interdisciplinary projects as well as works with an entirely aesthetic aim. The design choices and findings of *The Rough Mile* are presented in terms of this framework, leading to a discussion of the design guidelines that can shape its use in any HCI or interaction design project aiming for a deep, personal engagement through technology.

Author Keywords

Immersion; immersive; sound; performance; theatrical performance; experience; locative audio; gifting.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

This paper describes the way in which we designed an experience for gifting digital music according to practices and theories of immersive theatre. *The Rough Mile* is a two-part locative audio experience for pairs of friends to undertake; in the first part they select songs to give to each other, and in the second part they experience each other's gifts. We present a definition of immersion and a framework of immersive practices for HCI and interaction design researchers to explore and modify. Critically, this framework applies to *practices* that lead to immersion in

any number of contexts rather than practices of immersive *theatre* per se: the framework and definition can apply to a range of interdisciplinary projects. *The Rough Mile* is presented in relation to each element of the framework, from design to findings to discussion, showing how the framework can guide and illuminate design research into complex, valuable, and personally meaningful experiences.

RELATED WORK AND THEORY

Immersion in HCI and Related Literatures

As performance theorist Josephine Machon notes, 'In digital disciplines 'immersive' is used as an adjective to describe those computer displays or systems that generate a three-dimensional image that appears to surround the user' [24, p. 59]. This sense of being immersed in a constructed reality is reflected in work such as Sato and Salvador's 'focus troupes' using 'theater techniques for creating quick, intense, immersive, and engaging focus group sessions' [34] and Dalsgaard and Hansen's discussion of 'immersion in the whole situation of interaction' including embodied and social components of a broad interactive experience [11, p. 23]. Although approaches based primarily on immersion have not been 'proven' to work in an HCI or interaction design context, previous work using elements of immersive practice [e.g. 8, 25, 35] indicate its potential.

Machon also notes how in games studies the term immersion is 'often used interchangeably with 'presence'' [24, p. 59; see also 28, p. 81], while Vidyarthi et al expand on 'presence' to include the intertwining of both bottom-up/sensory and top-down/imaginative processes [38, p. 411], deducing that immersion is best served by a reduction of sensory input. Game design theorist Ernest Adams defines immersion as 'being unaware that you are experiencing an artificial world' [1, pp. 21-22], while Sweetser and Wyeth's GameFlow model of enjoyment experienced by video gamers claims that immersion refers to 'a deep but effortless involvement which can often result in loss of concern for self, everyday life and an altered sense of time' [36, p. 10]. These findings are useful in that they share an attention to imagination and a relationship with the real world, but the connections they draw between audio, narrative, and emotional involvement are not exhaustive.

Two pieces of research look into game players' own experiences of immersion. Ermi and Mäyrä offer a model of the components of gameplay experience: sensory

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immersion, challenge-based immersion, and imaginative immersion [13]. Brown and Cairns use grounded theory (on an admittedly small sample of gamers) and distinguish between ‘engagement, engrossment, and total immersion’ [9, p. 1297], a set of distinctions that can be useful in teasing apart various participant responses and the design choices that lead to them. However, unlike Mihaly Csikszentmihalyi’s related idea of ‘flow’ that both these works discuss, their definitions and models have not become common currency in the wider HCI community.

In terms of projects that extend digital experiences into the physical world, Waern et al note that immersion in pervasive games is enhanced by a lack of clarity ‘where the game ends and the ordinary reality begins’ [39, p. 1553]. A relevant body of work in this context is locative audio [44], a two-way engagement with constructed audio in a real-world environment [29]. Examples include Teri Rueb’s sound walks exploring loss triggered as participants moved through a national park in Canada (*Trace* 1999), Blast Theory’s audio guides prompting participants to record their own sound files in hidden places around London (*Rider Spoke* 2007), and Janet Cardiff’s surreal audio walk in search of a fictitious missing person (*The Missing Voice (Case Study B)* 1999). One project that looks specifically at immersion, *Riot! 1831* [30], moved their participants between the ‘parallel worlds’ of the history being represented through the audio component and the present-day real world of the location. They conclude that immersion in locative audio is likely to be a ‘fleeting’ experience, lasting several minutes at the longest. We find these projects and Reid et al’s model of immersion [30, p. 1736] to be useful points of reference, but they do not offer a substantial scope of strategies for producing lasting immersive states in a range of situations.

Most locative audio experiences use headphones, which have been noted to prompt an immersive state for the listener in terms of abatement, a loss of feelings of isolation, increased focus on landmarks in the physical environment, and a sense of congruence between the composed audio and the physical environment [18]. Many of these same factors have also been noted in the work of Michel Bull, who gives a rich picture of how people actively use music played through headphones whilst on the move to re-aestheticise their environment [10]. The work of [18] also shares similarities with the band Bluebrain [4], who have composed a number of locative albums to be listened to at specific locations. In these and other examples, key moments in the audio unfold in synchrony with key locales in the location.

Immersion in the Theatrical Performance Literature

We start our discussion of theories of immersion in theatre by asserting that in spite of its recent popularity in both commercial and academic discourse, immersivity is no guarantee of a compelling experience [24]. Moreover, along with Gareth White, we believe that there is no ‘interior of the drama itself’ [40, p. 230] that audiences can

access through immersion. Why, then, would we propose immersive theatre as a useful framework?

The answer lies in the ability of immersive theatre to enhance interaction such that people become unusually aware of their own feelings of engagement. They may become hyper-aware of their own presence, details around them, relationships with others, or long-ignored memories, or they may have new insights [24, 19]. What they are immersed in is ‘a reality that both replaces and accentuates the live(d) existence of the everyday, actual world’ [24, p. 61]. White describes this as ‘the set of surfaces that provokes depths of feeling in us as audience’ [40, p. 231]. This ‘set of surfaces’ is precisely what designers work with, and ‘depths of feeling’ describes topics such as affect, empathy, intimacy, and meaningfulness that many researchers seek to understand [see e.g. 17, 20, 35, 43]. Thus immersive theatre suggests possibilities for interactive experiences that deal with feeling and meaning.

To guide our discussion of immersive theatre, we use its three ‘central features’ as described by Machon [24, p. 71], extended with the most relevant ‘elements that are identifiable within any immersive experience’ [24, p. 93] in contrast to ‘traditional’ Western theatre, which situates its audience in fixed positions in a darkened room watching a distant stage [24, pp. 54-55]. We have selected Machon’s central and key elements and arranged them into four categories consistent with common concerns within HCI and interaction design. They provide reference points for how immersive theatre produces an ‘experiential’ interaction that puts ‘the audience at the heart of the work’ [24, p. 22] and ‘moulds them as co-authors of their experience’ [24, p. 23]. This is not only an excellent analogy for the work of many interaction and experience designers, but is also expressly included in the remit of ‘immersive practices’ that extend ‘beyond theatre’ [24, p. xix] and expressly includes digital technologies:

‘Immersive practice foregrounds a continuing relationship between technological systems and the body where the utilisation of technologies is concerned with artistic control and an experiential intent at the heart of the work... Such explorations in immersive practice go some way to enabling us to acknowledge and understand further the ‘human’ in our everyday interaction in these technocultural times’ [24, p. 36, emphasis in the original]

If ‘artistic’ can be taken to include ‘designerly’—and we believe that it can—then our framework of immersive practices derived from Machon’s theories (see Figure 1) may give us a concrete means for implementing and analysing techniques that can lead to aesthetic and emotionally meaningful experiences using digital technologies.

The Theatrical Immersion Framework

The first feature is **audience involvement**, which refers to both the physical **bodies** of participants and the **formations** of various relationships among audience members as they

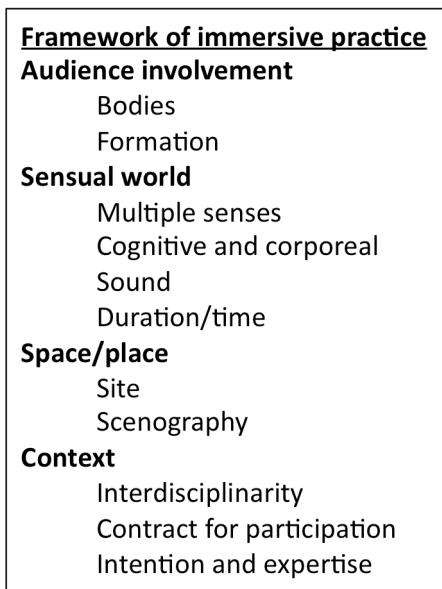


Figure 1. Framework of immersive practice, based on [22].

respond and interact. Examples include the close proximity audience members in a Punchdrunk performance of *The Drowned Man* (2013) might have to each other, or the intense frisson of finding oneself unexpectedly in a one-on-one encounter with a performer.

The second feature is the **sensual world**. Machon coined the punctuated term ‘(syn)aesthetics’, referring to the stimulation of **multiple senses** in combination, and the consequent experience of combined **cognitive and corporeal** awareness. Later efforts to recall immersive performance will result not only in cognitive retrieval but also a ‘felt’ sense of ‘intangible, inarticulable ideas’ [24, p. 81]. This echoes Vidyarthi et al’s [38, p. 411] understanding of the holistic creative/cognitive work that people undertake when becoming immersed in both ‘sensory’ and ‘imaginative’ ways [28]. **Sound** and **duration/time** are particularly important to the sensual world: using sound as a medium for conveying sensations, and making audiences viscerally aware of the temporal duration of their experience. For example, Silvia Mercuriali’s audio performance *Wondermart* (2016) takes two people at a time through an open, functioning supermarket, guiding their movements and thoughts via headphone in a way that allows them to maintain the appearance of regular shoppers. Mercuriali describes the connection between sound and the sensual world this way: ‘When...you’re pushing your trolley and in your ear it’s telling you what you would do if you were to steal it, suddenly you really are a bit apprehensive’ [24, p. 191].

The third feature drawn from Machon’s theory is **space and place**. She and other theorists (and practitioners) of immersive theatre place enormous emphasis on the use of particular **sites** and on the movement of audiences through space. In fact, the long tradition of site-specific and site-

sympathetic theatre is often cited as a significant foundation for current immersive practices, although site-specificity does not automatically imply immersivity [24, p. 94]. For example, Mercuriali’s use of a genuine market during open hours provides an irreplaceable context for interaction. Along these lines, **scenography** contributes to an audience’s felt experience of the space they are asked to inhabit: sites can be constructed and enhanced through scenography to just as powerful an effect as Mercuriali’s.

The final category of the framework is made up of elements that Machon finds no cohesive title for, but which we construe as composing the **context** of the immersive experience. Context is defined primarily by the **interdisciplinarity** of the experience, the **contract for participation** established between the creators of the experience and their audiences, and the **intention** and **expertise** of those creators. The premise of the genre is that it takes its audiences out of the comfort zone of traditional Western theatre, usually by introducing other disciplines and by paying attention to the ways in which audience members come to understand their roles. An example is Punchdrunk’s *The Drowned Man*, with its key elements of dramaturgy, dance, and architecture, and giving audiences strict instructions along with a mask they are required to wear at all times. Their intentions and expertise generally go unquestioned.

The framework that we have created based on Machon’s elements of immersive theatre not only structures the properties that constitute immersive theatre, but also covers a wide range of immersive practices that can guide work within interaction and experience design that aims towards the ‘immersive’. The categories of audience involvement, the sensual world, space/place, and context can provide much-needed organisation for design strategies that are currently thought of in terms of ill-defined ideas of ‘engagement’ or ‘presence’. The categories of immersion and examples of their use from the performance literature provide clear evidence of how to create sensory and emotional involvement in a designed experience. For example, the first three categories can help specify mechanisms for moving from Brown and Cairns’s ‘engagement’ to ‘engrossment’ and finally ‘total immersion’ [9], while the ‘context’ category addresses conflicts between the game world and the real world described by Waern et al [39].

Along with this framework, we propose our own tentative definition of immersion, based in the theatrical performance literature but attuned to the needs of the HCI and interaction design communities: *Immersion is a range of internally felt states in response to a designed event marked by an engagement on cognitive, emotional, and physical levels that focuses the participant’s attention to the exclusion of everyday concerns.*

To elaborate on this definition, we turn now to our case study, *The Rough Mile* (2016). We will map our design

choices and findings to the framework of immersive practice to demonstrate how a clear understanding of what constitutes immersive practice can guide the development of a meaningful experience with digital technology.

DESIGN

Our intention at the outset of the design process was to create an engaging, meaningful experience for people to gift digital music to each other. Our engagement with the literature on gifting in HCI and interaction design is outside the scope of this paper: we briefly note our reliance on previous work including [3, 5, 14, 15, 21, 23, 26, 27, 31, 32, 33, 37]. As the sharing of digital music files is not generally construed as an emotionally meaningful gift-giving process, at least in comparison to the exchange of physical gifts [23, p. 957], we made it our primary objective to heighten the emotional experience of the process of exchanging digital music. To help guide our design of this ephemeral gift-giving experience, we turned to the immersive theatre practices discussed above.

The Rough Mile was a two-part experience for pairs of friends, consisting of a pre-defined adaptive audio walk around a city centre. Parts 1 and 2 followed the same route but presented different audio content. In both parts, each pair arrived together. After undergoing formal consent procedures, one of the pair was given a smartphone equipped with custom locative audio technology (a native Android application known as the *daoPlayer*, see [42]), a set of bone-conducting headphones, and a map. Approximately five minutes later, the second of the pair was sent out in the same way, so that they could experience the walk at their own pace yet still be aware of the other's proximity.

Part 1 functioned as a standalone locative audio walk in the tradition of Cardiff's *The Missing Voice*. The content of our narrative involved the dilemma of how to choose a gift for a friend in distress, interspersed with six questions asking participants to choose songs to give to their friend, as well as directions for navigating the route. At two points along the route, actors taking on roles within the narrative recorded participants' responses to the questions about music to be shared with their friend. At the end of Part 1, participants were interviewed separately about their experience so as not to violate the surprises in their gifts.

Some weeks later when the audio gifts had been compiled, the pairs were invited to undertake Part 2. This time they heard the songs their friend had chosen for them interspersed with the associated questions from Part 1 and snippets of their friend's audio captured by the live performers. Participants were then interviewed together to gain insight into their reciprocal experiences. Two weeks later, they were interviewed individually again to capture their impressions of the experience as a whole.

In the following sections we present our key design choices, primarily for Part 1, as Part 2 was patterned on the same structure and depended so heavily on participants'

personal feelings about the songs chosen for them. The sections are arranged in an order that facilitates a more detailed description of the study; beyond that, they are presented roughly in order of their importance to the overall design. Note that we deliberately attempted to maximise each element of the framework in order to test it to its limits. A two-part event subjecting participants to (near) sensory overload, with gifting as its aim and research as its mode: if participants could immerse themselves emotionally and/or aesthetically in something this complex and multifaceted using techniques of immersive theatre, the framework must be worthy of further study.

Sensual World: Sound

The Rough Mile comprised four distinct layers of audio, of which three were prerecorded: spoken word (the narrative in Part 1 and participant comments in Part 2); a musical score (original music in Part 1 and participant song choices in Part 2); and an environmental soundtrack captured from the various streets along the walk (Part 1 only). To realise this use of sound, the audio was pre-composed, recorded, authored, and presented as a series of fragments triggered via GPS positioning as participants entered locales and passed through transition points, constructing one continuous, flowing audio arrangement that responded to each participant's pace.

The fourth layer of audio was real-time ambient sound [29, p. 271], which participants could hear because they wore bone-conducting headphones. These vibrate on the user's cheekbones and leave their ears completely uncovered. The headphones have the odd properties of making sounds seem to come from inside the user's skull and creating a buzzing or tickling sensation, connecting sound to touch. We blended potential real-world ambient sounds into the pre-recorded ambient soundtrack to create unusual or contradictory connections such as hearing bells tolling the wrong hour, or stopping at the sound of a tram horn only to realise that no trams were in sight.

'Sound in space is central to the immersive experience... [it] is often the key to unlocking an audience-participant's imagination. This is also true of audio-described experiences *through space*' [24, p. 128, emphasis in the original]. We drew motivation from this affirmation as well as from [18] and [4], namely the synchronisation of audio events to physical artefacts. We used the developing narrative and the built environment, such as the twists and turns of the streets, as a template for our musical composition, including the placement of and transitions between audio elements. Similarly, the narrative was written in relation to the felt experience of moving along the route. For example, a description of the main character's increasing paranoia was heard when participants moved from an open space into a cramped, crowded alleyway. Narrative, music, prerecorded ambient sound and real-time ambient sound worked together, aiming to prompt flights of imagination and memory.

Space/Place: Site

Different audio-driven engagements with the site were intended to conjure different emotional and visceral responses, ranging from compassion to concern, worry, fear, frustration, pleasure, and satisfaction. We aimed to be as subtle or indirect as possible without becoming opaque. This choice was influenced by Punchdrunk's advice to design in terms of 'gently flagging moments' for our participants: 'If we *tell* the audience what to see, we break the spell' [Felix Barrett in 24, p. 161]. For example, we described the main character's tendency to notice details such as the tree in front of the restaurant without suggesting that they themselves should look. Our route contrasted deserted back streets with busy ones, narrow pavements and open spaces. For the most part we drew participants' attention to easily overlooked details such as a tree in a tiny plaza in front of a restaurant, an old entryway that had been permanently glassed in, and a mural on an almost deserted road. Thus while our design process was entirely site-specific, it was not 'about' this site; rather, it moved participants gently through an engagement with details found in the site.

Audience Involvement: Bodies

Participants had a busy city centre to navigate, a storyline to follow, and countless sounds, smells, and sights to take in. We deliberately drew their attention to their own physical engagement with the world while giving them a storyline and background music that would influence their emotions towards their friend before asking them which songs they would like to give. In this we followed the advice of Lois Weaver, whose performance *On the Scent* (2003) solicited personal responses from participants. She used questions about homesickness that caused them mentally and emotionally to 'leave the room for a moment... giv[ing] them little pathways that trigger memories or that inspire them' rather than asking them 'immediately' and directly [19, p. 58]. In *The Rough Mile*, the audio layers provided pathways to memory or imagination while maintaining a complex present-moment engagement that gradually set up our questions and into which they could escape at any point. At all times, we sought to gently play on the participants' sense of themselves as physical beings, alternating between imagination or memory and a visceral sense of presence.

Audience Involvement: Formation

In structure, *The Rough Mile* was essentially a one-on-one experience, a particularly potent form of immersive theatre [24]. We sent participants out one at a time primarily to prevent them from breaking the flow of the experience by talking with each other, seeking each other's attention, or revealing their selections to each other. However, the situation and the narrative continually reminded participants that their friend was always nearby, and that their friend would experience the result of the participant's experience. We took our cue from immersive theatre practitioners Leslie Hill and Helen Paris: 'Interestingly, it is the possibility rather than the actuality of closeness that

defines the close phase of personal space; the frisson of the almost but not quite intimate' [19, p. 11]. We created a relationship between audience members of implied and impending intimacy rather than physical connection. This sense of potentiality and anticipation that would be subtly but corporeally felt throughout the experience.

Sensual World: Duration/Time

We leveraged locative audio to give participants full control of the duration of their experience, allowing them to take as much time as they liked to choose songs for each other and to listen to those songs (one of which was a 27-minute remix). Also, we intended that their awareness of the passage of time would contribute to the subtle but steady sense of their friend nearby. Finally, we hoped that the sense of duration combined with their embodied presence would make participants less likely to interrupt it to interrogate their own playlists on their own phones, look for or ring their friend, or otherwise break the fluid experience that we had created.

Sensual World: Multiple Senses

Immersive audio walks such as Cardiff's *The Missing Voice* appeal not only to the sense of hearing but also to vision and proprioception as participants integrate the everyday world they see around them with the imaginary world they picture in their minds based on what they can hear [24]. This 'emphasis on the sensuality of experience' [16, p. 196] was achieved in Cardiff's seminal work using binaural recording and headphones that blocked out much of the sound of the external world. Our use of bone-conducting headphones appealed to the intimacy of sound that could be felt on the user's skin but sounded like it was coming from inside their own minds [24, p. 128]. For example, the narrative was directed at the participant in the second person ('you') and imparted secrets that could ruin the life of the (fictitious) main character if the participant shared them. The bone-conducting technology was a significant contribution to the project's appeal to multiple senses.

Sensual Worlds: Cognitive and Corporeal

We could have approached the selection of songs to give to a friend as a cognitive task and provided access to participants' libraries or playlists to aid recall. However, we felt that this approach would not take adequate advantage of the emotional and serendipitous [22] elements of music selection. We sought a combination of cognitive and felt, emotional responses, or in Machon's terms:

'Individual imagination is key to this sensory intellect. ... In immersive theatres, space, combined with carefully executed activity, opens up a felt, live(d) poetic in both an epic and intimate manner so that the individual inhabits that world with intensity. ... Immersive theatres imaginatively combine a range of elements and techniques to heighten experience and defamiliarise everyday action, which establish worlds that hover in-between the felt sensation of the 'reality' and the 'unreality' of the experience.' [24, p. 143, emphasis in the original]

To design for this ‘sensory intellect’ between ‘reality’ and ‘unreality’, we used the combination of sound, site and context (described below) to put participants into an emotional state and frame of mind that was relaxed, generated concern for another person’s well-being, and brought their friend to mind in specific contexts. For example, after walking uphill on a deserted back street while listening to the difficulties the main character had faced growing up, participants came to a tram stop and were asked to imagine any place in the world they wished the tram could take them to, along with their friend. The mild difficulty of scaling the hill and their concern or pity for the character could put the participant in a mood to escape and find relief. Then, when picturing their friend in this ideal location, they were asked to choose a song their friend would listen to in that place. Would this necessarily lead to the most ‘perfect’ song choice? Probably not. But it would lead to a song choice motivated from caring and concern, rooted in contentment and relief, and selected spontaneously from the participant’s embodied and felt experience.

Context: Contract for Participation

The idea of a ‘contract for participation’ in immersive theatre often refers to subtle or even covert ways of manipulating an audience’s participation [see also 42]. In the case of HCI research, that contract is detailed in the ethics documentation. However, we felt it necessary to treat the world of the fictional narrative as if it were true (if only for the duration of Part 1) so as not to devalue this element of their experience. For this reason, the lead researcher set up each participant for their experience, during which time she spoke about the story as if it were true. She was also the story’s narrator, adding to the blurring of lines between fact and fiction [6] in the contract for participation. Even though participants were fully informed of the nature of the research, no HCI-style ethics contract could prepare them in advance for what might emerge [8, p. 18] such as how deeply they would engage with the task of choosing songs. Additionally, they had to negotiate how to react when, in interviews or recorded responses, their friend disclosed information about them. These elements are all implied in any contract for participation when participation covers potentially personal information.

Context: Interdisciplinarity

This project drew on working knowledge of HCI and interaction design, theatrical performance, locative audio, ethnography, and software development. This interdisciplinarity was particularly evident before and after Parts 1 and 2, where we prepared participants for their experience and then interviewed them. We ‘staged’ these encounters just as immersive theatre company Shunt uses a bar as a neutral area where participants can step away from the demands of the theatrical experience. Over time, Shunt have found the bar to be a key mechanism for creating a positive overall experience for as many people as possible [24]. We conducted our interviews in the upstairs café at our project partner’s record store, where participants had as

much ‘ownership’ of the location as we did and could interrupt the research process for a drink or a rest.

Space/Place: Scenography

Strictly speaking, there was very little scenography in this project, though we made bright yellow armbands to hold the smartphones running the locative audio player. Their placement was a technical choice, as the GPS was best detected when the device was held upright and at a consistent height, and the experience would stop entirely if the app were accidentally pushed to the background. The colour, though, was a scenographic choice (as costume is a scenographic element according to Machon [24, p. 94]). They helped our live performers to find and identify the right people to approach in the busy city centre, and they were intended to be an obvious marker to participants that the individuals who would suddenly and unexpectedly approach them partway through their audio walk were ‘in’ on the experience and not to be feared or dismissed (cf. *Uncle Roy All Around You* in [7]).

Context: Intention and Expertise

Clearly, we did not intend our design to constitute a work of immersive *theatre* per se. However, we aimed to follow the framework of immersive *practices* as fully as possible to create an overall experience that would approach the emotional, aesthetic, and meaning-laden impact that can be created by immersive theatre. This was particularly the case in Part 1, which we hoped would stand on its own as an aesthetic experience rather than being viewed simply as a means to a gift-giving end [cf. 12, p. 16]. The lead author has academic expertise and practical experience in performance-making, the second author composed the music and ambient soundtrack, and two other authors are accomplished musicians. We feel that our level of expertise is in line with the intention of our project.

METHOD

We advertised *The Rough Mile* as a two-part audio walk for pairs of friends. Potential participants signed up for a time slot in one of two days in April 2016 when we had use of our project partner’s space. We had 26 participants (13 pairs of friends), all of whom stayed in the study throughout both parts and all three interviews. As it took at least two weeks to create the audio gifts, the second part of *The Rough Mile* was scheduled at the participants’ convenience between May and July 2016. Ages ranged from 18 to 57, and relationships ranged from committed romantic partnerships through platonic friendships to work colleagues. As described above, we conducted individual interviews after Part 1, joint interviews after Part 2, and individual phone interviews two weeks after Part 2. We also distributed brief questionnaires after Parts 1 and 2. All interviews were audio recorded, transcribed, and subjected to thematic analysis that looked for clues as to how our participants responded to the immersive practices implemented in the design. Our key findings follow.

FINDINGS

Audience Involvement: Bodies

After Part 2, we asked participants to imagine three scenarios in which Part 1 was a purely online experience, and no physical involvement in the process of selecting songs for their friends was required. In one scenario, the website displayed a map of the route but offered no narrative, one played the audio of the narrative but offered no route or location information, and one had neither narrative nor route. Although several participants pointed out how convenient it would be, not a single one preferred these scenarios over a physical and narrative engagement with Part 1. Representative quotes include this conversation between a pair of romantic partners:

There's this old story where this guy gives a jar of sand to his teacher, I think it is, the thing is you went so far to get this, why, it's just a jar of sand? And the answer is, the journey is part of the gift. So the walk itself is when he did, that is, anyone can sit at a computer and think, Amazon, you can buy a gift by clicking the basket, but actually going to get it is part of that process (12B).

I feel the same. The experience of choosing it made me think more in a personal way about that person and what I want to give to them (12A).

Many participants commented specifically on how their bodily response contributed to their engagement with the audio walk and the larger gift-giving process: 'If you're walking around, yeah, like you say to your mate, aw, listen to this, because it takes you out of everywhere, that's what I've found. It took me out of town.... I forgot I was in town and it immersed me right in' (1A). While the convenience of online-only interfaces is appealing, it is worthwhile exploring the possible benefits of a bodily engagement with technological interventions.

One finding that flew in the face of our design intentions and expectations was the role of the live performers. The most common response was negative, with 14 participants objecting to the rupture in their immersion. Only three were unequivocally positive about them. One lesson to be drawn from this finding is, paradoxically, not to privilege live interaction amongst practices based on immersive theatre. Just as Cardiff's *The Missing Voice* and Mercuriali's *Wondermart* are understood as immersive theatre without a physically co-present performer, most participants felt that *The Rough Mile* involved them sufficiently deeply through our technologically mediated immersive practices.

Audience Involvement: Formation

The Rough Mile participants were physically alone (in a dense urban space) yet remained very aware of their friend's presence nearby. For example, '[my partner] has really tapped into my musical psyche... it was like I was doing the walk with [her]' (7A). Some participants (1A, 2B, 6A, 10A, 11A, 11B, 12A) were acutely aware that their gifts would be evaluated by their friend and expressed anxiety about the quality of their choices; all but one were

reassured that the gift was satisfactory. Participant 1A expressed her concerns directly: 'I was untrusting, I was like what if I don't know him the way I'm meant to know him, and all his songs are crappy, that can be terrible, I was worried!' But her partner 'wouldn't change anything' (1B), and they both visibly relaxed and smiled.

Sensual World: Multiple Senses

The bone-conducting headphones inspired strong feelings among our participants: all liked them immediately or soon grew to accept them, and one bought a pair afterwards. Interestingly, two found them to aid immersion despite the fact that they let in outside sounds: 'I'm so immersed' (8B), and 'they cancelled out other distractions and they let me follow the narrative' (4B). Ten spoke in terms such as the 'genuine' (3A) or 'personal' (13A) experience created by the headphones, 'as though someone was sort of talking to me' (5A); only one felt they caused a 'disjointed' experience (12A), though she liked them overall.

Bearing in mind the multiple types of audio, visual and proprioceptive stimuli that made up *The Rough Mile*, not to mention the feelings associated with the various relationships they were shaping, most of our participants gave evidence of some level of sensory overload. For example, although the spoken directions for navigating the route were complete, correct, and quite detailed, most participants relied on the printed map, and six (1B, 2A, 5A, 6B, 7B, 10A) went the wrong way and had to retrace their steps. However, only four (3A, 3B, 10B, 11A) complained that the heavy load on multiple senses was a problem. In contrast, indirect comments from most participants indicate they would likely agree with participant 3A that the combination of location and audio elements led to 'thinking differently', or with 6A that 'it made me look at things in a different way... and take different inspiration', or with 11B that he was 'encouraged to think a bit more laterally'. When asked to describe the experience of Part 1, 13 volunteered their thoughts on the narrative, 11 on the physical movement through space, 11 on how their own internal mental or emotional processes were altered, seven on the act of noticing they engaged in, two primarily on how it made them focus on their friend, and only four on the 'task' of coming up with songs for their friend. (Participants could discuss multiple themes.) Clearly, the project's appeal (or assault) on the senses of sound, touch, proprioception, and sight—including mental imagery and the sensation of novel impressions being made—made more of an impression than the cognitive task at its core.

Sensual World: Cognitive and Corporeal

Recall that the 'sensory intellect' discussed by Machon extends beyond the processing of information, aiming 'to heighten experience and defamiliarise everyday action' such that the immersant lives between 'reality' and 'unreality' [24, p. 143]. Thus an immersive experience in theatrical terms would be expected to include not only connections to 'reality', such as the successful selection of songs to give to one's friend or the sensible parsing of the

narrative, but also deeply felt connections to an ‘unreality’. We discovered many references to such experiences, none of which were directly solicited. Participants spoke in terms of ‘noticing’ things they had never noticed, ‘slowing down’ their movement through the city, and feeling a ‘permission to behave differently’. As in the *Wondermart* performance, some of our participants became aware of other people perceiving them, or aware of themselves doing things they wouldn’t ordinarily do (and weren’t aware at first of doing), or a ‘dreamy-ish’ (3A), ‘drifty’ (7A) perception of ‘unreality’ (4B), like being ‘in a film’ (9A), or like ‘I was not only in that film but almost like a viewer of that film simultaneously’ (8A, also 8B). Participants who had experiences like these talked about them animatedly and without provocation, indicating their importance in the overall experience. Simply asking them to move through the space would be unlikely to have generated these feelings, as many of the participants walk this neighbourhood daily without giving it a second glance; and simply asking them to think of songs would likely generate ‘just a playlist’ (13A) rather than this sense of unreality.

Sensual World: Sound

Our participants’ responses to the varied uses of sound in both parts of *The Rough Mile* could justify a paper on their own. Some were utterly absorbed in the narrative (especially 4B and 13A), others in the music, and others in the juxtaposition of prerecorded and environmental ambient sounds of Part 1. All of them were caught up in the songs chosen for them in Part 2 and particularly in the snippets of their friend’s voice that we incorporated into it, though for many different reasons: some delighted in choosing the same songs as each other (1A and 1B, 7A and 7B), while another enjoyed remembering the songs she had chosen for her friend while listening to her own gift in Part 2 (9B), and others were excited by the anticipation of what they would hear next (10A, 11A). Most evocatively, some participants (1A, 1B, 3B, 5A, 6A, 6B, 7A, 7B, 9A, 12A, 13A) found themselves smiling or even dancing in the middle of the city, some *without noticing*, or indeed without caring. ‘Lots of dancing... just spontaneous, couldn’t help, couldn’t keep my limbs steady!’ (7A). Sound, delivered in the rich context provided by this immersive experience, directly shaped participants’ physical and emotional responses.

Sensual World: Duration/Time

The fact that they arrived in pairs mitigated this freedom in our favour: no one spent more than a few minutes thinking of songs, and the participant with the 27-minute remix did not listen to it in full. From offhand comments made by several participants, we believe that this was primarily due to their awareness of the passage of time, which derived from the regular punctuation of both parts by questions leading them to think about songs for (or from) their friend in new ways. Happily, though, these punctuation marks do not seem to have disturbed their immersion. While Brown and Cairns find immersion in games to be fleeting [9] and Reid et al find immersion in location-based experiences to last up to several minutes at the most [30, p. 1735], 22 of

our participants felt immersed or absorbed through most or all of Part 1 (common exceptions being the interruption of the live performers or heavy traffic), and 20 through most or all of Part 2. For at least some, making time for reflecting on another person can contribute to this sense of immersion: the entirety of Part 1 ‘made me think about, you know, the person I was doing it with in ways that I probably hadn’t actually thought about before’ (5B).

Space/Place: Site

Our participants experienced a relationship to space and place that extended far beyond what was required for navigation and cognitive processing. For example, many noticed the thematic connections we had made between location and sound or story, even the most quotidian details, and brought up their observations even when not directly asked about it. Many also reported a tendency in Part 2 to stop and linger in the same places where they had been asked to do so in Part 1, even though Part 2 contained no such suggestions. Some either paid attention to the same details in Part 2 as in Part 1 or remembered parts of the narrative associated with particular places. This bleeding over of one experience to the next seemed to enhance the experience, as participants who reported these actions seemed uniformly positive about them.

Space/Place: Scenography

Our scenography needed to encompass whatever might occur along the route. Over the many different days of use, we had to contend with a number of unforeseen changes, such as a pop-up market that blocked the main square through which participants were intended to walk, tram horns and buskers that drowned out important audio, and a sudden rainstorm. Some of these were interpreted as breaks in immersion, as when participants were forced into spaces where the audio dropped out or lost their way due to missing an audio cue and had to use the map to find their way back. On the other hand, the rainstorm was a major topic of conversation in the interviews but did not ruin the experience, perhaps because it made participants more aware of their own physical interaction with the experience and more aware of their friend in the same predicament. The bright yellow armbands caused temporary self-consciousness in some participants. Surprisingly, though, some were so deeply engrossed in the audio walk that they did not even notice the performers’ matching armbands and consequently tried to avoid contact.

Context: Interdisciplinarity

We found that participants related more to some of the disciplines at work in this project than to others. For example, participant 5A was so involved in the narrative that he sometimes chose songs for the character in the narrative rather than his partner, much to her chagrin. Another’s first response to Part 1 was that his ‘main thought going around was I really enjoyed the ambient music track’ (12B). After experiencing both parts, many focused on the gift-giving element and how it affected their relationship: ‘it was a way of communicating through the

selection of music, and it was great to be able to give a gift to a friend which is something worth giving to him' (2A). A handful spoke in research-oriented terms of 'a project that was about digital gift-giving... we were given this device...' (11A). It is possible that our 'authentic' roles as researchers lent a sense of earnestness to a project that in a purely arts-based context might have been treated more critically. In any case, though, we found that participants were able to engage in a range of ways encompassing and extending beyond the aesthetics of the obviously 'artistic' elements such as the narrative or the composed music.

Context: Contract for Participation

Participants self-selected by responding to advertisements. No one completely averse to a participatory experience would have pursued the opportunity—although a keen participant might have 'dragged along' a less keen friend—preventing the awkward situation where a person is well into the experience before being surprised with an 'invitation' to participate [41]. While we lose the opportunity to play with the subtleties of such an invitation, our participants benefitted from relative clarity around what was expected of them. Also, through the mixing of fact and fiction, some participants established a complex relationship with the researchers. When the lead researcher (who voiced the narrative) conducted an interview, the participant often spoke in terms of 'your friend', as though the narrative were real and the character were actually the researcher's friend. In relation to the need to negotiate responses to revealed information: these disclosures were almost always happy occasions, but one (13A) was 'a bit insulted' when called 'materialistic' by his girlfriend (13B), and one (11B) felt his girlfriend (11A) had put so little personal effort into her gift to him that he went away, reflected on their relationship in light of this insight, and promptly broke up with her. He assured us that the experience neither caused nor contributed to their breakup, but it certainly did provide the opportunity for him to contrast his commitment to the 'contract for participation' with his girlfriend's, and find hers wanting.

Context: Intention and Expertise

Because our intention was to create a rich, multisensory experience that would facilitate a two-part gift-giving process, we did not have a single effect in mind for our participants to experience. Happily, 22 of our 26 participants felt that they had come up with satisfying gifts for each other. In the context of immersive practice, though, we find the range of participant responses far more interesting than whether we achieved our main aim. When asked about their most powerful memory from the entire experience, some participants spoke in terms of the tiniest details, such as looking at graffiti while listening to Metallica (1A), a four-word snippet from her friend's audio (2B), or smiling as Nina Simone began to play outside the restaurant (5A). Others describe generalised feelings emerging from an unusual or aesthetic experience, such as wondering whether or not he was actually *in* the narrative he was listening to (8B), gaining a new insight into trusting

her friend (12A), or feeling bonded with her friend (9A). One remembered her struggle thinking of a good song, followed weeks later by her partner's approval (5B); another's 'peak moment' was realising she and her partner had chosen two of the same songs (7B); and a third treasured the unusual feeling of sheltering from a sudden rainstorm while listening to a melancholy song (8A). What these and many other responses have in common is that *not one of them was directly intended*. Immersive theatre practices appeal to different people in a multiplicity of different ways, and our findings show how rich and varied the responses can be.

DISCUSSION

In light of the findings, we now discuss the key themes that we feel may transfer to other HCI and interaction design research in light of our framework and definition.

Embrace the interconnectedness of the categories within this framework: The framework was distilled from Machon's monograph, which is a much more fluid and overlapping text than our neat framework would imply. It is also founded on the multi-sensory perceptions and multi-modal reactions that participants have to immersive theatre. Many of our findings could fit sensibly under a variety of category headings, and many are best understood in relation to each other. In particular, we believe that our findings confirm Machon's assertions about the combination of the cognitive and the corporeal, supported by Waern et al's comments about pervasive games benefitting from a blurring of lines between the pervasive game and the real world [39, p. 1553]. The rest of our findings are similarly fluid, with experiences of Part 1 clearly shaping perceptions of Part 2 and vice versa. While categories are good for explaining, the most important implication for designers is to aim for the combinations, even the convolutions, that might come from a complex and complementary set of design choices. Among other benefits, it allows for participants with different attitudes and expectations to come away with something valuable based on their unique reactions to such a complex situation.

Exploit the power of forming audiences based on relationships: Our next point is the power of 'audience formation', or the relationships among participants. In the most common performance paradigm, audience members cannot be assumed to be acquainted with each other. Experience design is not bound by this paradigm, though, and is particularly well equipped to address specified user groups, even pairs of friends. In fact, by designing for pairs of friends to think about each other, we discovered that reflection on a relationship with a friend is a state into which participants can become immersed, an understanding of 'immersion' that we did not even suspect at the outset of this project. HCI researchers might contribute significantly to the theatrical performance literature (and of course their own) by rigorously exploring new audience formations made possible by interactions with technology.

Consider the ethical implications of forming audiences:

Another way in which HCI might easily expand this performance-based framework is in the contract for participation. Previous HCI research has explored the ways in which media sharing practices relate to autobiographical performance, particularly in respect to how information about other people is inherent in people's 'autobiographical' stories [35]. There is clearly a need for discretion and ethical consideration when dealing with information about people who have not had the opportunity to give their consent. This was also the case, perhaps even more so, when our participants revealed information about each other in *The Rough Mile*. What are the limits of informed consent, and what are the consequences for research into personally meaningful digital media? This framework can help researchers to integrate these concerns into the fabric of their designs.

Explore solitary social interactions beyond social media:

The Rough Mile introduced a nuance in the concept of the 'participant' and social experience. Pairs of participants may have undergone the physical experience separately, but their attention was directed towards each other, and they felt the constant possibility that they might encounter their friend at any moment. The result of Part 1 was a gift specifically for that friend, and the result of Part 2 was twofold, the experience of the gift they received as well as feedback on the gift they had given. These multiple pressures on the participant's attention mean that not only did they spend at least part of the experience focused on their friend, but their participation can only be understood in full in relation to that friend. The 'success' of one person's experience was dependent in part on how each person in the pair evaluated their gift—and as we saw, many were anxious that their gift would be deemed adequate. Each participant's friend was enormously important to the experience, including to some degree its immersivity, yet this internally experienced relationship with another interactant is (to the best of our knowledge) not currently theorised. One implication is that a participant might experience *The Rough Mile* multiple times with different friends and have a different experience each time, adding value to repeat 'performances' on the basis of audience relationships.

Use audio as a starting point for multisensory immersion:

Finally, this framework directs attention to the creators as well as the participants in an immersive project. It is difficult to discuss intention and expertise in general terms, especially in relation to the work of other researchers. However, we believe we can make some useful assertions about ours in relation to the *Riot! 1831* project reported in [30]. Our primary intention was to create a personally meaningful process of gifting digital music, but our means of doing so was to design a two-part experience, the first part of which should ideally stand on its own as an aesthetically valuable event in its own right. In this sense, we had an 'artistic' intention alongside the more quotidian

one of gifting, but even there, our aspiration was to create an emotionally valuable and memorable gift exchange experience. We do not know Reid et al's artistic expertise, but we feel we can deduce something of their intentions. The two elements that correlated with immersion for them were 'enjoyment' and 'history coming alive' [30, p. 1734]. Their aim seemed to be a community engagement with the historical events of 1831, creating a 'parallel world' that participants could get immersed in through audio plays presented at relevant locations. To get fully immersed in the audio, many participants felt the need to 'shut [their] eyes' [30, p. 1735] to switch between the two worlds. Thus 'the prominence of the real world environment means that the immersed states are short with continual dipping between the parallel worlds of the digital and physical' [30, p. 1736]. We argue that where Reid et al aimed for immersion whose intent was to bring alive a parallel world through audio, our intent was to bring alive a multi-faceted engagement with a multiplicity of worlds: location, memory, imagination, and most of all, the participant's relationship with their friend. With these multiple points of engagement, we created a robust sense of immersion across multiple senses that brought relationships to life.

CONCLUSION

We believe that references to 'immersion' in the HCI literature would benefit from a shared definition and framework for understanding what is or can be implied by the term. Based upon our experience of creating and reflecting upon an immersive locative audio piece using a framework of immersive practices based on Machon's study of immersive theatre [24], we feel ready to propose that framework (see Figure 1) and the resulting definition for use in the HCI community. We hope that other HCI and interaction design researchers will take up the opportunity to hone and develop them further using a range of different interactive technologies, as the resulting knowledge might helpfully bridge some of the many gaps between artistic/aesthetic practice and the concerns of the HCI community. The framework might also be applied retrospectively to existing work, to tease out a finer level of granularity of the user's experience. However, we want to acknowledge immersive theatre's ties to the experience economy rooted in neoliberal politics and economic policies that many find to be suspect [e.g. 2]. We hope that at least some of the uses of this framework might interrogate the limitations and possible negative implications of the current drive towards immersion in the theatre literature.

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