

Telling stories in soundspace: placement, embodiment and authority in immersive audio journalism

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Abigail Wincott, Falmouth University, Tannachie House, Woodlane, Falmouth, UK.

abigail.wincott@falmouth.ac.uk

Jean Martin, University of Brighton

Ivor Richards, Falmouth University

Abstract

There has been an increase in the use of immersive or spatialised audio formats for radio and podcast journalism. Immersion is used to put audiences to the heart of a story, enable richer experiences, and encourage empathy with others, but it can disrupt the ‘grammar’ of broadcast formats and the codes that structure the relationship between audience, journalist and story. Immersive journalism research has not tackled the impact on audio-only storytelling, and the lack of research by and for audio journalists means programme makers have until now lacked a conceptual framework and terminology to describe how space is constructed in immersive audio, the creative and editorial choices available and their effects. This article, based on analysis of immersive output and interviews with those who produce it, critically examines the differences between mono/stereo space and immersive audio space and argues they are not only a matter of aesthetics or comfort, but communicate differential authority over the story and merit further attention when journalists are trained in immersive audio.

Introduction

Immersive audio, also referred to as spatial, surround, 360 or 3D sound¹, has a longer history than its visual counterparts VR and 360 video. Binaural recording traces its history back to the 1880s (Paul 2009; Pike 2019, 66) and immersive sound has been used in cinema since the early 1990s (Kerins 2011), as well as by sound artists and soundscape composers (Batchelor 2019; Bull 2018; Cobussen, Meelberg, and Truax 2017; Licht 2007, 2019; Westerkamp 1989). Until recently, though, radio journalism had little use for it. Radiophonic story worlds were delivered in single source monophonic, commonly known as ‘mono’ or the narrow left

and right of a stereophonic sound picture, because radio was broadcast, and though binaural can be transmitted in stereo FM, other formats cannot. At any rate, there was little point transmitting binaural sound when most people were listening on single-speaker radios. In the research we report on here, we found some experimentation in its use in programme-making took place in the 1970s and early 80s: binaural drama and features were produced in Germany (Krebs 2017), quadrophonic and binaural sound was used at the BBC (details of which can be found on the BBC Genome website), and some content by Radio France in the 1990s was produced using Dolby Surround. However, the techniques were not adopted widely, resulting in some loss of confidence about the relevance of 3D sound technology for many years (Roginska 2018: 52).

Immersive audio is enjoying a renaissance now. The technological developments are partly driven by its continued role in cinema and gaming (Melchior, Churnside, and Spors 2012). Producers and journalists are less restricted by broadcast technology as audio content is increasingly delivered to audiences online around the world (Mayhew 2018; RAJAR 2019; Winn 2020) – by traditionally print media as well as legacy broadcasters and newcomers. It remains hard to get listeners to sit still in the ‘sweet spot’ of a surround-sound speaker set-up, but with headphones replacing radio speakers for ever larger numbers of listeners (Futuresource 2019; Stefani 2020), binaural in particular² presents itself as a fairly cheap and accessible means to produce a form of immersive audio journalism. Indeed, the development of cheap and lightweight in-ear microphones and hand-held ambisonic and binaural microphones have also made experimentation with spatialised sound far more accessible to individual producers and journalists, though the larger broadcasters have access to a greater range of tools for capture and mixing as well as expert technical support.

Whereas much earlier experimentation was led by individual sound engineers and producers, contemporary production draws strength from being sanctioned at the highest level. Radio France created a division devoted to immersive audio production, called Nouv0son, in 2013 (Dussert 2019) and audiences can find immersive audio productions on a dedicated website, Hyperradio. The BBC’s R&D division has conducted research over several years and, together with Radio France, Germany’s Bayerischer Rundfunk, Radio France Internationale (RFI) and others, is part of a major project to develop a flexible system for delivering spatialised sound (<https://www.orpheus-audio.eu/>) to consumers. It is therefore led by senior managers, who are interested in competing for audiences in a rapidly changing marketplace. The practical details are developed by audio engineers, whose research is concerned with technical questions about the convincing reproduction of sound (Floros and Tatlas 2011; Hacıhabiboğlu et al. 2017; Herre et al. 2015), with some work on the user experience of convincing immersion and the potential for added value for consumers through technological improvements (Francombe et al. 2017; Francombe et al. 2018; Lee and Kim 2013; Melchior, Churnside, and Spors 2012; Vinton et al. 2017; Winslow 2015; Yao 2017). Some writing also questions concepts underpinning this work such as ‘immersion’ or ‘presence’ (eg. Agrawal et

al. 2019), but for the most part, immersive audio is considered uncritically for its potential to enhance the consumer's entertainment experience, and research is framed in terms of testing technology and measuring the user experience. Editorial and creative questions fall outside the scope of this work, yet they are of central importance for journalists and producers of narrative factual content.

There is of course already an emerging field of immersive journalism, which does explore such concerns. Immersive journalism is understood to mean virtual reality and 360 video, formats very different in terms of their temporality, linearity and interactivity and dominant visual component. For journalists and documentary makers working in immersive audio, there is therefore not yet a body of work to guide them which centres their needs. That is the gap, between VR journalism and technical R&D, that this research project begins the work of addressing by scoping the field to discover the issues facing those making journalistic content using immersive audio. Over a period of four months, the authors interviewed 18 people who have worked on immersive audio journalism, in the UK, France, the US, Qatar, South Africa and Australia. Some were independent producers, some work for large media organisations. The interview questions were informed by our own experience in factual radio and journalism, and by the VR Journalism literature. Questions were deliberately open-ended and the project exploratory, designed to be led by interviewees' own experiences, in order to open up new directions for future research and training that focus on the specific needs of content producers in radio and podcasting.

Through the interviews, we discovered how new equipment affects habitual production practices, the ways organisational practices can unwittingly constrain the growth of immersive audio production, and the need to critically examine the meaning of the term 'immersive' when it comes to audio (Wincott, Martin and Richards 2020). In this article we focus on the meanings and uses of the sound space itself.

Spatial audio formats offer the chance to place interviewees, presenters, and other voices in a much wider range of positions around the listener, which can provide a greater sense of immersion, offer a larger or more spacious sound picture and enable the listener to distinguish better between people and environmental sounds. In addition, someone steps into the sound scene for the first time: the listener. This 'presence' of the listener at the heart of the story, as witness to the events (Chainon and Chainon 2018; Owen et al. 2015) is one of the chief attractions of immersive journalism, but our interviewees found it produced unexpected confusion and raised new questions. Working with spatial audio further reveals a new role for mono and stereo sound, which can produce the sense of a voice inside the listener's head (known as inside-the-head localisation or internalisation, while spatialised sound is externalised). Not only are programme-makers operating with three dimensions of sound space then, but internal and external space. What difference does it make if some people's voices appear to be inside the listener's head, while others are external in the act of listening? In this article we examine how choices in spatial arrangement might signal

differential authority to speak on an issue and have the potential to influence perceptions of an individual's metaphorical position in the story as well as their literal one.

We are not the first to note the challenges that working in immersive media pose to the construction of journalistic narratives. Immersive journalism has been a dynamic and growing focus of research and development in recent years (Mabrook and Singer 2019; Watson 2017). It is seen as having enormous potential to target new and hard-to-reach audiences and engage people more deeply when there are so many demands on their attention (Jones 2017; Koski 2015; Pavlik and Bridges 2013). It is often deployed to encourage users to experience what it feels like for people living through events in the news, and claims are often made for its capacity to elicit closeness, empathy and other kinds of emotional engagement with people and events, especially those happening far away (Chainon and Chainon 2018; Elmezeny, Edenhofer, and Wimmer 2018; Owen et al. 2015; de la Peña 2016; de la Peña et al. 2010; Van Damme, All, De Marez and Van Leuven 2019). This power to move audiences has always had a role in journalism, but it becomes more important when information is instant and ubiquitous.

This affective immersion is associated with a technologically enhanced sense of spatiality, of a medium which is in three dimensions or 360 degrees, and bodily inhabited, rather than viewed on a screen. The development has led to a subtle shift in conceptualising stories, whereby it has become possible to talk about 'spatial narratives' (Dominguez 2017) and a kind of reification of the news story, which a person can 'enter' and move around in, returning afterwards, changed (Alzamora and Tárchia 2012; Chainon and Chainon 2018; Dominguez 2017; de la Peña et al. 2010). We noticed these ideas about transportation and affect in our interviewees' understandings of immersive audio.

The spatialisation of narrative and interactivity all introduce new complexities to journalistic norms and practices (Mabrook and Singer 2019). Techniques for montage, camera angles and framing, graphics and text, in vision reporting, and voice-over narration are no longer deemed desirable, because they destroy the illusion of an unmediated environment, the sense of 'being there' (Aronson-Rath et al., 2015; Dominguez, 2017; Elmezeny, Edenhofer, and Wimmer 2018; Murray, 2016; Healey, 2018). Revisiting the conventions of audio-visual editing and the visual perspective of the audience is deeply disruptive because these aspects of TV grammar play a role in establishing journalistic authority through the performance of objectivity and impartiality (Tuchman, 1972, 1973, 1978).

These changes have yet to be fully explored and have not been explored at all in radiophonic speech, which, unlike VR, is not very interactive, if at all and which has its own grammar and conventions. These structure the way a story is told, structure the relationship between different voices heard, between the reporter and anchor, and between all these and the listener. These conventions have a long history and are structured by codes familiar to audiences and producers, but perhaps partly because audio production studies is less formalised and less widespread than, say film studies, our interviewees seemed to lack a

common set of terms to describe the issues they face when they began working in spatialised sound.

They found that its particular qualities – the extended space, the greater precision of spatial positioning and the externalisation of sound – meant they had to think differently about the placement of sound in space, and plan recordings in ways they were not used to. They described successful content as ‘visceral’, ‘painting a better picture’, ‘a level of fairy dust’ and ‘spacious’, but some was seen as problematic or failed in regards to the placement of three different kinds of contributor to the story: the listener, interviewees and the presenter/reporter.

The listener

The listener is always tacitly acknowledged through formal aspects of presentation and reportage (Clayman 1991; Hutchby 2006), but by convention they are conceived of as *external to* and usually also *after* the story, which is related to them largely in pre-recorded material. Feature makers have often used complex soundscapes and iconic sounds (Crisell 1994) to give a sense of immersion in a scene, but it is more like the rich description of text, a narrative immersion (though early radio dramas used techniques to create a more precise sense of space (Verma, 2012)). In formats like binaural that offer technical immersion the listener is not external, but internal to the sound scene by definition, because it happens in 360 degrees *around them*. This shift from external observer to internal actor in immersive audio, who can freely turn their attention to different sound events around them, is mentioned by several interviewees in this project. Cathy Robinson, producer and trainer at the BBC, likens it to ‘you as a listener stepping onto the stage with the action. [...] You suddenly become a part of the action, you’re in the middle’. Hervé Déjardin of Radio France immersive production division, Nouv0son, echoes this: ‘if I am in mono, I’m a witness. I watch. If I am in 5.1 or immersive sound, [...] I am in the scene.’ This begs the question, if the listener is in the scene, where in the scene are they, and what they are doing there?

Considerations of a listener’s auditory perspective are cultural as well as technical (Théberge, Devine and Everett 2015). The ‘point of audition’ (Altman 1992; Chion 1994) or POA is the commonly used and much debated term (Høier 2012), modelled on TV and film’s point of view (one reason Verma (2012) prefers ‘audioposition’) that describes the position from which we listen in a scene. In immersive sound, there is both a greater range of possibilities for the POA, and a greater precision in our ability to localise sources of sound, that is, to tell where they come from. In VR the sense of being immersed or transported is strongly identified with having the POV of a character in the scene (Dominguez 2017, p.7).

Some programme-makers have given the listener the POA of the reporter/presenter. This is an obvious solution for the lone reporter, who can wear cheap and easy to use in-ear binaural microphones, and it offers a POA some interviewees called a ‘first person experience’.

However, the effect can be odd or uncomfortable when listening back. Penelope Thomas, a journalist and producer of a binaural drama based at the Australian Film, Television and Radio School, Sydney, suggests the ‘oddness’ is a product of the way such recordings capture interactions between the recordist and their environment, which can make the listener feel disembodied, ‘if you are offered a first-person perspective but the responses to the environment are not your own’. The presenter’s voice will also disrupt the intimacy of a first-person experience (Tom Parnell, immersive audio specialist, BBC R&D) or produce a sense of discomfort (Becky Lipscombe, BBC senior field producer).

Some productions attempt to offer the listener a POA of their own, as a bystander or guest but this can also feel awkward. Newton and Soukoup (2016) found VR users feel disoriented or uncomfortable in a scene if they don’t understand their role. That need not be an active role but could be that of a student in a lecture theatre or perhaps a bystander at an event, in other words, a role comprehensible and appropriate according to familiar social scripts. Becky Lipscombe recorded a dinner at a round table for a documentary, and considered, but ultimately rejected, both placing recording equipment in the centre of the table and ‘eavesdropping’ over the shoulder of the guests as uncomfortable or odd, before finally offering the recorder its own seat so ‘you’ll feel like you’re sitting with us at a table’. Being a fellow diner, listening in while seated at a table is a socially acceptable position to adopt, while being in the middle of the table at dinner is not a position with a recognisable social script. One BBC local radio team recorded a studio discussion around a dummy head as an experiment, which should have helped differentiate between speakers, but was seen as a failed experiment: ‘everyone hated it, because they wanted to keep looking behind them when the person behind them spoke’ (John Heraty, broadcast engineer and trainer, BBC). Newton and Soukoup report that for some VR users, being in the middle of a scene is always uncomfortably voyeuristic, even with a plausible role associated with being there, and one might expect being in audience for a studio debate could constitute such a role.

The discomfort of listening back to a dummy-head surround recording might be explained by close placement of speakers to the microphone around a small table and a wider sound picture might help. It might also in itself be too ‘spectacular’, subverting the listener’s expectation of mono sound or conventional stereo, which in its familiar disembodiment seems more realistic or natural (Kerins 2011). Immersion cannot capture unmediated reality, but always constructs a new media reality that can become accepted by convention. TV’s over-the-shoulder shot and the ability to eavesdrop on events as a fly-on-the-wall is commonplace in conventional media formats, even though it fails to conform to social scripts from the unmediated world. This suggests we have media scripts for conventional POAs, and where a POA fails to conform to these, in an experimental media form, there is a risk that ‘being there’ becomes the more negative ‘eavesdropping’ or ‘voyeurism’, terms used to describe unsuccessful POAs by several interviewees.

Very rarely the listener is addressed directly by a presenter. One example is ‘Joujouka’, a binaural edition of the BBC series *Wireless Nights* about the mystical music traditions of a Moroccan village, which according to the programme webpage was ‘first discovered by Western ears in the 1950’s’. Here, presenter Jarvis Cocker asks the audience to come with him at each stage, introducing musicians by name. Speaking directly to the listener as an embodied person is not usual in factual radio, despite its famed intimate address to the single listener (Douglas 2004: 311) (though it is a device used in US old-time radio drama). It creates for them a first person perspective and a role as themselves in the scene. In ‘Joujouka’ it feels playful and slightly awkward but it does reframe our POA from an observational, tourist gaze (Høier, 2012, section 4). In this case the awkwardness of the encounter demands that the listener remain aware of their presence among the villagers, their entitlement to be there, or lack of it.

In conventional radio journalism, the listener is always there, all-hearing, but not acknowledged and never challenged to play a part (Dolan and Perets 2016; Dominguez 2017). Some producers attempt to replicate this in immersive formats. Josh Rogosin of NPR describes working as sound recordist in a series of immersive features, holding a quadrophonic mic array, a silent and unacknowledged presence in the sound scene, recording the discoveries of the presenter in conversation with interviewees as they travelled down a river in a canoe: ‘I think [the listener is] me. [...] I am accompanying as a sort of fly-on-the-wall, so they are the fly on the wall.’ Spatialised audio’s more precise localisation of sound can make this non-specific POA tricky to pull off, presenting a potential oddness described above. But even where it works, the question is whether facilitating the fly-on-the-wall sensation could negate the embodiment and sense of ‘being there’ that is regarded as such an important quality of immersive journalism.

Chion (1994) suggests there is an important distinction between spatial and subjective point of audition. Spatial POA refers to the physical position from which I hear (I am in a canoe, I am on the table), while subjective POA relates to questions about whose perspective I am experiencing the scene from, and therefore who I am invited to identify with. If journalists and documentary makers want to manage listeners’ engagement and empathy in an immersive sound scene, it should not be assumed that spatial POA will inevitably generate subjective POA and empathetic connection. In fact, there are a range of techniques and choices about placement of interviewees and other voices in the sound scene that impact strongly on the extent to which we are invited to identify with them or regard them from a distance.

Interviewees and other voices

The choice of where people and sounds are placed is not neutral or a mere matter of reproducing reality, notwithstanding the use of terms like ‘actuality’ or ‘binaural capture’, but part of the construction of a media space, in which reality is represented and stories told.

Significant choices are made about placement on the lateral plane in 360 degrees and in terms of what is sometimes called proxemics – closeness or distance between those who speak and those who listen.

It is known that the position of sounds can stimulate emotion and influence the interpretation of material and that this happens precognitively, in other words faster than rational processing of informational content (Ekman and Kajastile, 2009). Ekman and Kajastila found that in games design, sounds were perceived as scarier when they came from behind than in front, and when they were diffuse rather than easily pinpointed, something that is also exploited in horror films, and that Chion (1994) calls the acousmatic or reduced listening mode. In the context of journalism and factual programmes we were told that sudden noises like a phone ringing or a voice from behind were distracting and broke the illusion of non-mediated immersion. But might some placement of sounds be less striking, and yet influence meaning at that pre-cognitive stage? What does it mean to place a contributor behind the listener, or alternatively to the side, or in front?

Placement has a literal or indexical meaning: this person is behind you, but this person is in front of you, and so on. But we suggest placement can have an extended signification too (Crisell 1994). Xavier Gibert of RFI produces *SessionLab*, interviews with musicians and live music sessions, in multi-channel spatialised audio, mixing down to binaural for listeners. While in a stereo mix, he would reduce the loudness of the music under interviewees' speech – the conventional 'fade' developed in the early days of sound recording (Crisell 1994: 45; Madsen 2010) – instead he moves the music to the back. This kind of fading in *space* rather than *level* is possible because we pay attention to speech at the front and can mentally tune out whatever is behind. After all, we turn to face someone to show we are giving them our full attention and language reinforces this bias. Putting something 'front and centre' means paying attention to it, while putting things on the back burner or turning our backs on things mean the opposite. Thought should be given to the ways spatial positioning on the horizontal plane in immersive audio might lead to interpretations about their significance at an unconscious level.

Interpretations of the meaning of placement in space are likely to be affected by many factors, including explanations within the sound scene. For example, if the listener concentrates on the speech of the musician-interviewee in *SessionLab*, they may also be prioritising the spoken word over music, and understand they are expected to listen to what the person has to say. A voice from behind may be explained as someone guiding us through a doorway or piloting a boat. If their speech is signposted (a presenter asks them a question, they have already been introduced by name) then we may pay them attention, even though they are behind us.

The study of proxemics considers how people communicate social closeness and distance through spatial information of their speech (Høier 2012; Maasø 2008). Closeness and distance produce differential status, intimacy, formality and so on, think for example of the

difference between a murmured comment in someone's ear and a speech delivered to an audience. The proxemic effects of a piece of audio journalism are affected by immersive formats. Some of our interviewees describe immersive audio as more spaciousness and therefore comfortable than mono and conventional stereo. However, sound captured in immersive formats, especially binaural, is also prone to becoming indistinct: a 'mush' (Cathy Robinson) or 'wishy-washy' (Josh Rogosin, Tom Parnell), and voices as too distant, even sounding 'off-mic' (Cathy Robinson). That spaciousness then could be distancing and reduce the sense of intimacy or closeness to the story and the people in it.

In contrast, mono capture of voices is described as 'intimate and clean and direct' (Josh Rogosin). For this reason, Cathy Robinson, for a recent documentary series about homelessness ('Hearing Homelessness', 5th August 2019), chose to capture ambient sound in binaural, but record interviews with street sleepers using a close mono microphone. She describes the transition from binaural to mono in the finished mix as 'zooming in'. This effect may be what Høier (2012) calls an 'active POA'. This is not the same as a subjective POA, where we identify with the speaker and inhabit their perspective, but one where we are close and called on to pay attention. A close-miked mono voice is also less embodied, less material, and this has implications for their authority to speak on their own situation, as we discuss below in the section on the narrating voice.

A voice recorded at some distance from a microphone, especially in binaural, retreats from the listener and is not well distinguished from other sounds. It becomes part of the scenery or background, part of the colour of a colourful immersive atmosphere. It may encourage the listener to adopt what Høier (2012) calls an observational POA, which inhibits connection and empathy. The decision to differentiate between the soundscape the homeless person hears (binaural) and the voice of the homeless person (mono) is therefore a decision to differentiate the person from their situation in the sonic space.

Immersive audio is often used for lively scenes where the location is central to the story – Cardiff's street life at night, a Moroccan village, a Voodoo ceremony in Benin ('Voodoo in West Africa' 2004), a trip to meet an uncontacted Amazon tribe ('Omay', 16th June 2018) or to explore prehistoric rock art in the Chauvet caves ('L'Ardèche souterraine', 5th August 2015). According to our interviewees immersive audio's value partly lies in the potential to offer the listener a visceral experience, to transport them somewhere extraordinary, spectacular even, where they cannot go in real life and choices assume a listener for whom these locations are unfamiliar. In journalism, immersive experience is expected to also inform or encourage learning: 'slip in a few facts' (Becky Lipscombe). As with VR, learning in immersive formats is understood largely as getting audiences to care about distant or difficult stories, understand what news events feel like for those living through them (Chainon and Chainon, 2018; Dominguez 2017; Van Damme, All, De Marez and Van Leuven 2019). The webpage for the BBC programme 'Hearing Homelessness' (2019) claims:

The programme is made using binaural recording, which allows the listener to hear the world through someone else's ears, as though the sound is coming from beyond their head. They're placed in a location through sound, and through this immersion they come away with a very personal understanding of what life is like for someone living a very different life to them, right under their nose.

The relationship between immersive mediated experience and empathy is not straightforward (Jones 2017; Van Damme et al. 2019). Moreover, output like this treads a fine line between offering representation to the under-represented and providing poverty or crisis tourism. The mono recording of homeless people's voices in 'Hearing Homelessness' and the invitation to enter the scene in 'Joujouka' can be seen as attempts to manage this balance. A third technique is used in a documentary about regional accent, class, and identity from Radio France ('L'Accent et la Cigale', 12th October 2016). Director, Nathalie Salles recorded interviews with people from the south of France in mono and distributed their voices in a spatialised sound picture in post production. The result is a non-naturalistic sound scene, where the point of audition is not the same as the placement of the microphone. Though they are distant from the listener, these voices are close to the microphone, crisp, clear, and strangely disembodied. They are laid over a bed of iconic southern cicadas throughout, which was captured in multi-channel surround sound. If their voices had also been captured in spatial audio, might these southern people also seem to be part of that 'natural' soundscape of the south, exoticised, more embodied yet depersonalised?

Presenters and reporters – the narrating voice

Though there is a long (perhaps the longest) tradition of un-narrated montage formats in radio features and documentaries (Crook 1998; Madsen 2012), a presenter or reporter often plays a central role in structuring the story and directing the attention of the listener (Clayman 1991; Clayman and Heritage, 2002; Jones, 2017) and this is true of the immersive programmes and features we listened to. Through scripted or semi-scripted 'links' they make a case for the newsworthiness or importance of the topic, provide information, and contextualise what the listener is hearing, including whether it is recorded in the past, is an interview, a debate or a trip to a special location. The presenter's links also frame the other speakers, aligning them with different forms of qualification to speak on a subject according to whether they have first-hand experience, are experts on a topic through studying it for example, also whether they are brought in to be impartial analysts or specifically to advocate for one view on the topic (Clayman, 1991).

The presenter orchestrates all speech of the programme or package; other contributors do not interact but are woven into a story through them (Clayman 1991: 54). Their authority then is the authority of the story, and an audience's trust in the veracity and importance of that story rests on their trust in the reliability of the narrator. Many of the conventions of radio talk do a lot of work establishing and maintaining a presenter's authority through the performance of

neutrality (Hutchby 2006), heading off potential anxiety about the objectivity of mediated accounts of events (Punday 2003: 156).

Many studies of the performance of neutrality by broadcast journalists look at language and speech (Clayman 1988, 1991; Hutchby 2006; Scannell 1991). This includes accents that don't betray too much of geography or social class (Scannell and Cardiff 1991: 176), the way they may question others while not being questioned themselves (Clayman 1988), and the absence of normal conversational responses to interviewee answers (Hutchby 2006). Symbolically all these conventions help the journalist perform impartiality, not only by demonstrating a lack of personal engagement in the story but a lack of personal identity and embodiment in general.

Other aspects of broadcast speech formats also have a role to play. In TV news framing of shots often emphasises the distance of reporters to the scenes they report on (Tuchman, 1972, 1973, 1978). Commonly the recording of 'links' is done in a neutral acoustic, close to the microphone. This means there is no reflected sound and no ambient sound, so the presenter is lifted out of the embodied space of the story, while other contributors are more clearly embodied and placed in the soundscape. The montage format takes this even further, of course: a journalist shapes the story, even if their voice is absent as an index of their physical existence. Such differential embodiment establishes differential authority in storytelling (Punday 2003). So much is true of mono and conventional stereo programming, but the difference becomes even more striking in an immersive audio mix where we might expect all speakers to have an embodied presence in a shared 3D soundspace.

By long tradition that narrator's voice is in mono or in a stereo mix, is front and centre in a stereo picture. What this means in practice is that the voice is localised inside the listener's head, particularly when listening on headphones (Pullki and Karjalainen 2015: 220). This inside-the-head localisation is not possible in binaural, meaning for Tony Churnside, BBC sound engineer and independent producer 'a major change in convention, that is going to be disruptive to audiences [...] you've gone from 'there's a narrator inside your head' to 'there is a narrator somewhere else'. Working in immersive formats has drawn attention, we can conclude, to something that already existed but was so commonplace as to be unremarkable – the idea of the narratorial voice, so disembodied and dematerialised that it may enter the listener's head.

Producers and journalists newly conscious of the need to position the presenter in immersive audio have tried out various techniques and are satisfied with them to differing degrees. In-ear microphones can enable a first-person experience, discussed above. Others mention a reporter standing by the side of the listener, taking them on a journey, or standing behind them, showing them the view. Although there is a precedent for people talking to us from the side or behind in real life, direct address has no counterpart in modern conventional broadcasting.

One response has been to reject the use of immersive capture for the presenter, and instead to retain the close-miked mono voice, and mix it front and centre, with atmosphere or actuality captured in binaural or another immersive format. In this case, some sounds and voices come to us from the outside, while the presenter has the gift of apparently speaking straight into our brains, a position which should make the voice more authoritative through its disembodiment (Punday 2003), yet an intimate voice, which speaks softly right into the head of the listener (Maasø 2008). Hervé Déjardin of Radio France muses on the power this interiorised voice might have:

If a sound is in my head, it's me. It's me who is thinking. So if you get a commentator and they are in my head, it's a bit like they're in my subconscious somewhere. But if that voice is exterior, it's more like it isn't me, there's a differentiation. And so the voice of that person in my head or exterior, I think that's got to change the way I form my opinion on a subject.

This echoes Don Ihde's (2007) phenomenological exploration of the internal voice, which is elusive in its spatiality, seeming to be 'nowhere or everywhere' and having these qualities, 'carries the significance of not being "other," but rather of being my thinking' (139). Caution is required, however. The address of the presenter is intimate, but an address nonetheless and it has already been mentioned that hearing another's words from one's own perspective produces an uncomfortable sensation, suggesting a clear awareness of the fact the voice is not one's own. This is backed up by VR research on in-the-head localisation (Dominguez 2017; Floros and Tatlas, 2011; Hacıhabiboğlu et al., 2017; Kyriakakis, 1998; Lalwani 2016).

Though no one will confuse the presenter's voice literally with their own, localised inside-the-head it has a disembodied quality, especially if, recorded close to the microphone, in a 'dead' or unreflective and quiet environment, it will give no cues to the location of the speaker (Maasø 2008). It has a longstanding parallel in written fiction, where narrators and central characters are disembodied or less embodied, but peripheral characters' physicality emphasised. Differential embodiment encourages us to identify with the main character at the expense of the peripheral ones (Punday 2003: 15). Immersive formats expand the range of difference, between the extreme disembodiment of inside-the-head localisation and far more marked materiality of immersive soundscapes.

Conclusion

The larger and more clearly differentiated sonic space of immersive audio formats presents journalists and factual programme-makers with an opportunity to make more vivid and transportive sonic experiences for listeners. It also forces them to work differently, planning how to use sonic space, where to place people in it, and taking the presence of the listener into account. This is disruptive and time-consuming, and our interviews show those learning to use immersive audio can produce what they see as failed attempts. Yet these challenges

provide an opportunity to see afresh the way that radiophonic speech conventions operate and the special qualities of immersive sound. Most strikingly perhaps, spatial sound's externalisation makes it possible to appreciate the qualities of mono sound, which does not become obsolete, but can be woven in with spatial audio in the mix.

Because of a lack of research by and for audio journalists, programme makers have until now lacked a conceptual framework and terminology to describe how space is constructed in immersive audio, the creative and editorial choices available and their effects. In this article we have drawn on terms and ideas from a range of fields – broadcast and VR journalism, the linguistics of mediated speech, narratology, and film sound – to build a conceptual framework with which to articulate and interrogate some of the issues to do with spatiality that our interviewees told us they experienced.

We suggest point of audition is a useful term to encourage producers to think about when they plan microphone placement and mixing and consider the position of people and objects in a 3D soundspace. The adoption of a particular spatial POA in recording or mixing can be used to encourage a subjective POA, associated with engagement, empathy and commitment to people and their stories. But equally spatial POAs that encourage Høier's objective and observational modes may also be useful in encouraging different ways of engaging with accounts of events and with sufficient signposting, listeners could be offered changes in POA and therefore perspective on events during longform documentaries and features, or POAs which reveal only partial information. The nuances of point of audition should therefore be taught to new users as they learn the importance of planning a spatial recording with a purpose.

Though the word is rather technically specialised and might be off-putting, thinking in terms of proxemics invites programme-makers to consider not only placement and direction but distance. Distance has an impact on the centrality or peripherality of people whose stories are told, and on affective relationships that are fostered between listener and the subject of news and documentary, something often talked about in terms of closeness (Van Damme et al. 2019). Proxemic differences help to create the range of POAs possible in spatial audio. Differing distance from the microphone has always been a feature of radiophonic recording, but that differentiation is potentially far starker in spatialised sound, because of its greater spatial range. Our research shows how the more experienced producers use mono recording in the mix, meaning we need to think not only of distance and closeness, but interiority and exteriority.

These proxemic choices produce differential embodiment of those speaking, and with it, differential authority over framing of ideas and information and differential power to direct the attention of the listener. Journalists should be conscious about how their spatial proxemic techniques might make certain people's voices part of the atmosphere or actuality of events, while others are established as impartial authorities on those events. Embodiment therefore is another important concept. In immersive media, the listener also has a more embodied sense

of being in the story. Our interviewees say it is therefore important to ask what their role is, what they are doing in the scene and VR research tells us that thinking about how their role might map onto existing social scripts can help programme makers manage the comfort of listeners. Immersive audio is often used in content about spectacular and exotic locations, which plays to the strengths of the technology and offers audiences a vivid experience. This could work against attempts to create connections with distant places and people because spectacularisation and exoticisation are distancing, encouraging listeners to adopt a voyeuristic or touristic position on a story. Such questions for producers must go beyond what is comfortable or works, as they are deeply political, and training and development in immersive production needs to engage with that.

We offer this framework of inter-related concepts – POA, proxemics and embodiment – tentatively and suggest it could be refined and improved through testing it out in training workshops. But it begins the process of articulating and therefore understanding what is different about working in immersive sound, and why certain creative and editorial issues arise during its use for journalism and documentary. In this way we hope training and development can move beyond thinking about technical issues and successful reproduction of realistic sound to encompass the development of sophisticated editorial understanding and creative skill. This better understanding and increased immersive production skills should not be used to find the least obtrusive, most comfortable ways to reproduce conventions of features radio, where the listener retains their comfortably distant and disengaged position. It might also be used to generate strategic discomfort, to make listeners aware of their closeness or distance to people and issues, to be conscious of their own position in the story and that of interviewees and reporters and the relative privilege of these different positions

Though some of our interviewees described the listener as an actor, stepping onto the stage, how can an immersive audio listener actually act? Immersive audio offers less interactivity than VR, and VR journalism tends to offer less interactivity than entertainment formats (Jones 2017: 179). What listeners can do is interpret a sound scene, including their role in it and where they should pay attention and managing their discomfort or changing POA, for example. In addition, they could be asked to do more cognitive work in prioritising where to listen in a complex sound scene – the spatially highly complex sound scenes in early radio drama (Verma 2012) could provide ideas for what is possible in factual output. In mono and stereo radio, it is understood the producer must prioritise for the listener through selective fading of sounds in the mix (Crisell 1994), but immersive sound allows the listener to better distinguish between sound sources, which is why speech can be heard over music in *SessionLab* as long as the two are differentiated in space. This means a sound mix can remain more open until it is cognitively completed by the listener. Choosing what to hear is not a passive act (Dominguez 2017; Newton and Soukup 2016).

In discussions about the use and meaning of space in spatialised audio journalism, we and our interviewees have considered our own responses to the work, generalising from this to

understand the likely meaning or sensations for listeners. Though existing radiophonic conventions and codes suggest ways listeners are likely to understand and interpret scenes and stories, audience research for VR and on technical aspects of listening in sound engineering suggest there is some variation in how people experience and respond to immersive media. We suggest some experimental production of narrative journalism implementing this framework above, with audience research, will help increase understanding about the range of ways listeners experience different points of audition and how they interpret spatiality and proxemics in immersive audio.

1. Definitions of these terms are all contested and our interviewees did not agree on usage. There is no space here for a discussion of possible distinctions. For our purposes what they all have in common is that they offer something like a 360 degree sound picture for the listener, or ‘technical immersion’ (Elmezeny, Edenhofer, and Wimmer 2018) and some also offer height too. Our focus is not on the differences between these technologies or the terms used, but on the impact of this extra space on factual radiophonic narrative. Therefore in this article we will use ‘immersive’ and ‘spatial’ as generic terms. ‘Immersive’ follows the example of existing immersive journalism work and ‘spatial’ describes well the additional spatial information in the sound picture.
2. For an introduction to binaural and the different types of spatial or immersive audio and how they work, Kyriakakis (Kyriakakis 1998) and Melchior, Churnside and Spors (2012) are a good introduction, as is BBC R&D’s Chris Pike’s (2019) thesis, which is available free online.
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3. Most of the programmes here are mixed binaurally for headphone listening, which is ‘headlocked’, that is when I turn my head or walk forward, the sound scene moves with me. In a surround sound speaker set up I could walk between speakers, but not make sounds occur or change through my actions.

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