SOUNDTRACK AS AUDITORY INTERFACE: EXPLORING AN ALTERNATIVE TO AUDIO DESCRIPTION FOR THEATRE

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1 INTRODUCTION

Theatre conventionally relies heavily on the visual, for instance to convey narrative and context, and to set the scene. This reliance can significantly hinder the experience of blind and visually impaired people, and can in some cases exclude them entirely. Audio description for theatre attempts to make performances accessible for blind and visually impaired patrons by translating the visual aspects of a performance into a spoken commentary that fits between the gaps in actors' dialogue. However, while 40% of UK theatres have offered at least one recent audio-described performance,[1] a number of issues are prompted.

We describe the use of an ambiently diffused soundtrack as an alternative to audio description for theatre as part of a recent research project at the University of Wolverhampton. Informed by conceptualisations of the soundtrack posed by theorist-composers Michel Chion and Stephen Deutsch, our approach is to use an assemblage of informative and emotive sounds to provide a kind of auditory interface or "way in" to the performance. Crucially, the soundtrack evokes and implies but, contrary to audio-description, does not enforce a single rigid or fixed interpretation. Additionally, use of the house sound reinforcement system (in a 5.1 configuration) also removes the need for specialised and potentially othering personal equipment. The remainder of this paper provides background to the project, outlines the theoretical basis of the project, discusses two trial performances and initial findings, and finally offers some suggestions for future work.

2 BACKGROUND

2.1 The Visual Turn in Theatre

While John Cage emphasised the importance of the ear and close listening in particular, the backdrop to his iconic 4'33″ was an increasingly visual culture.[2] This visual turn is described by new media theory pioneer Marshall McLuhan in terms of an imbalance and a loss: a barely-controlled slide from the "sensus communis" of Ancient Rome, to the "lopsided", overwhelmingly visual brain of the mid-20th century and beyond.[3] In the case of British theatre, however, Jacky Bratton is able to identify a considerably earlier visual turn. Before 1800 and as far back as the time of Shakespeare, she argues, theatre relied primarily on an auditory presentation modality.[4] The continuation of this modality may be due, at least in part, to legislative restrictions. For instance, while London had become the largest city in Europe by 1790,[5] strict licensing restrictions meant that its population continued to be served by only three main theatres: Covent Garden Theatre, Theatre Royal Drury Lane and, in the summer season only, Theatre Royal in the Haymarket.[6] As the only venues officially allowed to stage "serious drama", the patent theatres were effectively shielded from direct competition and, with a large population to fill seats, had limited incentive to radically alter or innovate. Performances featured prominent actors and extensive declamation. Sets were largely static, minimal and unobtrusive, so as not to detract from the spoken word.[7]

Two broadly coincident factors brought an end to this vococentricity in the early 19th century. Firstly, the Covent Garden and Drury Lane theatres burned down in 1808 and 1809 respectively, and had to be entirely rebuilt.[8,9,10] Meanwhile the Haymarket theatre moved to a new site in 1821.[11] The new buildings did not mimic their prior designs, and two of the three theatres significantly expanded their capacity. These architectural changes, allied to broader social changes, caused the patent theatres to lose their almost rarefied atmospheres. Indeed, price increases at the newly reopened Covent Garden theatre led to riots.[12] More generally, the patent theatres became rowdy, often extra-theatrical meeting places, where audiences were not necessarily seated and their noise could drown out the declamatory style of the actors.[13] Second, authorities

started to allow the number of theatre operators to expand and diversify, conferring "burletta" licenses to a spate of smaller venues along the Strand in the heart of central London.[14,15]

In the case of the patent theatres, new lighting technologies, stage technologies (e.g. hydraulics) and visual effects were developed, effectively countering, deliberately or otherwise, the rowdiness of audiences.[16, 17] Alongside these technical advances, a more spectacular and easily readable acting style evolved, characterised by a more prominent role for gesture and movement alongside speech.[18] In the case of the new, smaller theatres, the terms of the burletta licenses explicitly prohibited performances of the classics.[19] However, the need to circumvent these restrictions did much to spur the development of new theatrical forms. Notable examples include: melodrama, physical theatre, pantomime, silent and musically-accompanied action, and acts featuring acrobatics and animals.[20]

If at times over the last century the popularity of theatre has appeared threatened by the development of new forms of entertainment such as cinema, television, pop concerts and, later, computer games, it has not only survived as a niche form of artistic expression, but also persisted in the mainstream: every year millions of people attend spectacular productions on New York's Broadway and in London's West End.[21,22]

No matter what their complexity, the visual elements of a theatrical performance, taken as a united construct that includes set, props and gesture, communicate multiple types of information simultaneously. They can convey narrative, set the scene, or help to provide context. Indeed, Tadeusz Kowzan emphasises how even the smallest details can play an important role:

> *Everything is sign in a theatrical presentation. A cardboard column means that the scene takes place in front of a palace. The beam of the spotlight picks out a throne and here we are inside the palace. The crown on the actor's head is the sign of royalty whereas the wrinkles and whiteness of his face, obtained with the help of make-up, and his hesitant gait are all signs of old age.*[23]

2.2 Audio Description and its Discontents

That theatre has come to be so reliant on the visual poses a significant barrier to access for blind and visually impaired people. While visual impairment encompasses a variety of conditions and affects all ages, older people are disproportionately affected.[24] In the UK alone, 360,000 people are formally registered as blind or partially sighted, but the Royal National Institute of Blind People (RNIB) estimates the number affected is over 2,000,000. This number is predicted to double by 2050 as the proportion of elderly people rises.[25]

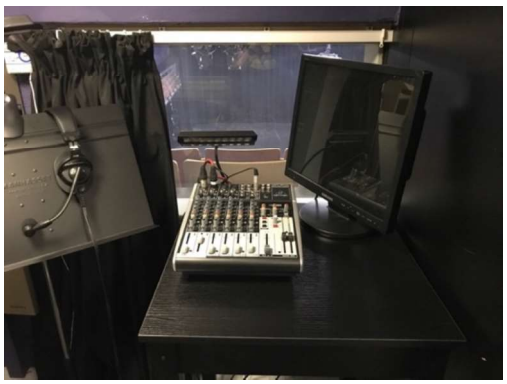

Figure 1. Example of a control room with audio description area. There is a clear line of sight to the stage through the window.

Audio description for theatre attempts to make performances accessible to blind and visually impaired people by translating the visual aspects of a performance into a succinct spoken commentary that fits between gaps in

the dialogue.[26] Smaller productions usually use a single trained audio describer, but the Audio Description Association (ADA) and ADA Scotland recommend the use of two describers where possible. This is intended to enable ideas, notes and description to be cross-reviewed in order to improve their quality and reliability.[27] The audio describer or describers often produce preparatory notes in advance of a performance but the audio description is delivered live (so as to be able to respond to performance nuances), typically from a soundproofed control room that offers a clear view of the stage (Figure 1). The description is then relayed, usually wirelessly, to the individual personal headsets of service users.[28]

This main part of the audio description service is preceded by two complimentary elements. An optional touch tour is held around an hour before the start of the performance. This enables service user to access the stage to explore its spatiality and handle a range of tactile objects such as props, costumes and furniture.[29] This is followed, shortly before the performance starts, by the broadcasting of pre-recorded introductory notes. These notes are not only intended to provide background information, but also provide a means to test that the audio description equipment is functioning correctly.

Audio description for theatre is relatively well established in the UK, with 40% of theatres having offered at least one audio-described performance between 2013 and 2016; often provided by one of three main operators: VocalEyes, Mind's Eye and Sightlines.[30] However, as audio describer Louise Fryer notes, there remains little empirical testing of audio description methods,[31] and numerous human and technological issues are raised. These include:

- limited gaps between actor dialogue restrict opportunities for audio description;
- audio describers attempt to provide a single, definitive description, thereby limiting the potential for alternative interpretations by audience members;
- that attention is continuously pulled between the stage sound and in-ear sound is a potential distraction and a hindrance to immersion and flow;
- personal headsets/headphones may be found othering by some service users as they are visually differentiated from other patrons;
- headphones create a personal, isolated sound space and may limit communal experience;
- specialist equipment is expensive, requires expertise and can be time consuming to set up and troubleshoot.

2.3 Related Work

There is considerable related research, although, to the best of our knowledge, far less that shares our specific focus on theatre. For instance, focussed on film and television, the ongoing Enhancing Audio Description (EAD) project by Lopez and colleagues explores how the experience of audio description can be augmented and enhanced by sound design and spatialisation techniques.[32]

Beyond audio description, there have been numerous attempts at using sound to replace visual information, across a range of disciplines. While the extensive history of the radio play is an obvious point of reference, particularly relevant is Fuel Theatre's Fiction.[33] This uses binaural audio to lead seated listeners on a dream-like journey through a mysterious high-rise building primed for demolition during the course of the play. In particular, most of the audio (dialogue, music and some sound effects) is played through headphones, but the house Public Address (PA) system and visuals are used to provide additional, more visceral ambient effects.

Elsewhere, as early as the 1960s, Paul Bach-y-Rita and colleagues pioneered the concept of sensory substitution and offered an early practical demonstration in the form of a tactile chair.[34] Informed by this earlier research, a team led by Adam Spiers has developed the Animotus; a handheld cube that uses vibration motors to provide discreet haptic navigational cues. The device was subsequently integrated into a site-specific theatrical performance of Flatland set in the darkened interior of a church.[35]

The next section describes the theoretical basis of our own approach to making theatre accessible to blind and visually impaired people.

3 THE SOUNDTRACK AS INTERFACE

Since the first concerted efforts in the mid-1960s to the present, interface research and Human-Computer Interaction (HCI) research specifically have been spectacularly successful; fundamentally changing how technologies are designed, as well as human-technology relationships more broadly.[36] For Jef Raskin, as interest in technical advances for their own sake has diminished, the interface has become increasingly prominent, and, by the late 1990s, arguably the single most important part of a product:

> *Users do not care about what is inside the box, as long as the box does what they need done. What processor was used, whether the programming language was object orientated or multithreaded, or whether it was the proud processor of some other popular buzzword does not count. What users want is convenience and results. But all that they see is the interface. As far as the customer is concerned, the interface is the product.*[37]

Bert Bongers conceptualises the interface as a line separating two domains, emphasising that, if an interface is to be useful, rather than create a barrier, it must span the two sides and join them together.[38] In the case of this research the two domains to be linked are unconventional: theatre performance and visually impaired audience. Indeed, if taken at face value, Raskin's notion of interface prominence could appear antithetical to a theatre context: the more prominent the interface, the more attention is drawn away from the content of the performance. However, in many respects prominence is closely related to disappearance, or how an interface can become so unobtrusive and the experience it offers so smoothly flowing as to be no longer noticed. Indeed, what Raskin[39] touches upon is that, as computers have developed, users have become less interested in how the technology works and more interested in the overall experience: to the extent that the underlying mechanisms effectively disappear. This shift to designing experiences rather than artefacts or products was made explicit early on by Donald Norman's appointment as "User Experience Architect" at Apple in 1993.[40]

The properties of ambiently diffused sound are of particular interest in the context of interface design. On one hand, sound is slippery and expansive: although not always palpable, it is able to fill spaces and permeate certain boundaries, including those of the human body.[41] On the other hand, the human auditory system has a fine resolution in the time and frequency domains, and is able to accurately localise and temporalise sound events:[42,43] even if the temporal and spatial domains are not necessarily independent. For instance, Chion notes that "if the sound at hand is a familiar piece of music, however, the listener's auditory attention strays more easily from the temporal thread to explore spatially".[44]

While interface research has focused overwhelmingly on the visual and, to a lesser extent, the tactile, the use of non-speech sound has been explored to a limited extent, primarily in relation to sonification, auralisation and audification techniques.[45] These efforts have resulted in developments ranging from earcons[46] to assistive technologies,[47] but their aims are not necessarily compatible with a theatre context: in the latter case an interface not only needs to convey quantitative and descriptive information, but also affective and emotional dimensions.

The conveyance of these more abstract qualities has extensively been explored by the film soundtrack. Rick Altman states that if the soundtrack initially consisted of separate sound elements, by the mid-1930s it had developed into a "fully coordinated, 'multi-plane' soundtrack capable of carrying and communicating several different messages simultaneously".[48] Related to this, Deutsch describes the soundtrack as a combination of "intentional" sounds of "literal" and "emotive" sounds.[49] Literal sounds are primarily informational in that they help to convey physical properties and cause and effect. They are therefore closely connected to believability. Conversely, emotive sounds help to influence the mood of a scene. Chion similarly describes the soundtrack as an artificial assemblage of different types of music and sounds,[50] that enable different modes of listening. He makes broad distinctions between different types of music and sounds. Most notable are:

- diegetic and non-diegetic sound
- empathetic music and anempathetic music

Diegetic and non-diegetic sound relate to the implied or actual presence or absence, respectively, of the sound source on screen.[51] Empathetic music actively participates in the mood and emotion of a scene, while anempathetic music is conspicuously detached from and does not respond to the visual.[52] Chion then outlines additional sub-categories: "ambient sound (territory sound)", internal sound, and on the air sound.[53] Ambient sound is particularly pertinent as the ability of its presence to delineate the identity and nature of a place is closely related to how a main role of audio description is to convey information about the site or setting of the performance.[54]

The authors of the EAD project state that "disabilities should not limit the options on how to experience audio-visual media and that the diversity of preferences by visually impaired people cannot be reduced to one accessibility method, but on the contrary requires a user-centred personalised method that allows audiences to make choices on access strategies."[55] While the soundtrack is obviously only one method, a significant difference compared to audio description is that the soundtrack does not attempt to enforce a rigid interpretation: it implies and evokes rather than states, and meaning is ultimately left open to the individual. In other words, multiple "ways in" may be discovered by the audience.

Equally important to notion of the soundtrack as interface is that sounds not only have the ability to describe a specific space, but also aid orientation and navigation within that sound space. McLuhan, for instance, raises the notion of sounds as cues, recalling: "Sounds had the same individuality as light. They were neither inside nor outside, but were passing through me. They gave me bearings in space and put me in touch with things. It was not like signals that they functioned but like replies."[56] Similarly, Mark Grimshaw and Gareth Schott propose the concept of navigational listening, whereby "certain sounds may be used as audio beacons helping to guide players, especially those new to the particular game level, around the game world structures."[57] A related aspect is how the placement of sounds can also imply how much attention is required. For instance, Grimshaw and Schott describe how, in a video game context, loud sounds that occur close to the player usually demand immediate attention. These "signal sounds" are effectively an aural indicator that something important is happening and needs to be addressed by the player. These prominent sounds can be contrasted with more distant, usually more constant sounds that let the attention of the player drift elsewhere.[58]

After the introduction of film sound (i.e. fixed sound on film), the development of the soundtrack has been closely tied to advancements in sound diffusion, from the stereophonic experiments of Disney to the ubiquity of various Dolby technologies in cinema theatres and the home.[59] The role of spatialisation in the soundtrack has been extensively discussed. On the one hand, spatialisation is seen as playing a practical role in ensuring clarity of dialogue.[60] However, the spatial aspects of sound can also be used to convey visual information such as the positions of cast, props or set in space, or more abstract information related to filmic techniques.[61] If headphones are, to some extent, also able to localise sounds, in the case of this project the use of spatial sound and surround sound in particular is considered desirable for at two main reasons. Firstly, the entire audience can be enveloped in sound (effectively as one), and thus there is no requirement for headphones that differentiate visually impaired patrons from other audience members. Second, the creation of a single, unified sound field that includes actor dialogue but also informative sound and music means that there is no pulling of audience attention between onstage and in-ear (i.e. headphone) sound.

4 THEORY INTO PRACTICE

To start to explore the potential of the soundtrack as an alternative to audio description, an evaluation study was carried out in Spring 2017. The study had three distinct elements:

1) the creation of a soundtrack for Bert, a semi-autobiographical play about suicide by Black Country-based comedian and poet Dave Pitt;
2) two performances of Bert for invited audiences of blind and visually impaired participants;
3) group interviews held immediately after each performance.

4.1 Composing the Soundtrack

The soundtrack consists of a mixture of "literal" and "emotive" sounds, and ambience (in the Chion sense). After an initial period of familiarisation with the script, a plan of sound types and environments, and their temporal placement in relation to the script, was sketched out on paper. The literal sounds were recorded first. They include: footsteps on gravel, the opening of a garage shutter, a radio being manually tuned, a stalled engine, a slammed door, and an industrial fan unit. Where possible, these were recorded in a Foley studio to maximise separation from background sound. Other sounds were recorded outdoors using a Zoom H6 handheld recorder. Sound sources were captured from multiple perspectives, with microphones used as a kind of lens to enable a focus on "small" sounds (i.e. sonic details) that might otherwise go unheard.

With a basic structure of literal sounds in place, a series of subtle (i.e. background) ambiences were recorded on location. The script determined the type of spaces used: a front garden and a domestic garage, but several different examples of each type of space were recorded to create variety.

To create the emotive (i.e. more conventionally musical) content, fragments of the previously recorded sounds were played back through loudspeakers of different sizes into a series of concrete-walled spaces and re-recorded. This process causes the new recording to take on the acoustic characteristics of the place it was re-recorded. Selective iterations of the process determine the intelligibility of the original signal.

4.2 Experimental Setup and Methods

Twenty-five people participated in the evaluation study. These include 14 men and 11 women, with a range in age from 35 to 81 years. All participants self-reported as visually impaired, and all were visitors to the Beacon Centre for the Blind in the West Midlands. Around half (16) of the participants were accompanied by a companion who watched the performance but did not otherwise participate in the study.

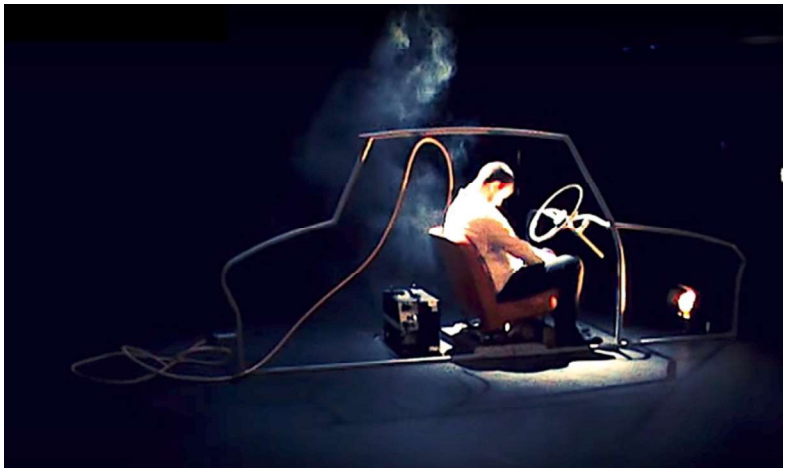

Figure 2. Image from the second performance of Bert at the Arena Theatre in Wolverhampton (UK) on the afternoon of Friday 3rd March 2017.

The two performances of Bert were held on 3rd March 2017 at the Arena Theatre in Wolverhampton: a 150 seat city centre venue whose programme places an emphasis on accessibility and diversity. Both performances exposed the audience to established audio description methods in addition the soundtrack. To minimise the effect of the duration and narrative arc of the play on participant responses, the performances adopted a mirrored structure: the first half of the first performance and second half of the second performance employed the ambiently diffused soundtrack without audio description. Conversely, the second half of the first performance and first half of the second performance then used audio description only (i.e. without soundtrack). Participants were allocated randomly to either the first or second performance: thirteen participants experienced the first performance, and twelve experienced the second performance. Audio description services were provided by professional describer Roz Chalmers and delivered live. The

soundtrack was pre-recorded, mixed and then divided into scenes. These multichannel sound files were then sequenced along with lighting cues in Figure 53's QLab[62] show management software and triggered live. To reduce costs and setup time, both performances used the house PA/sound reinforcement system in a 5.1 surround configuration and the house's mixed (infrared and Wi-Fi) wireless audio description headsets.

At the end of each performance participants were interviewed in a group by an experienced facilitator. The interview questions aimed to find out about participants' previous experiences of theatre, and their experiences of the Bert performance specifically. The questions are presented in turn below alongside participant responses. Note that not all participants chose to respond to every question.

5 INTERVIEW FINDINGS

How often do you attend the theatre? (e.g. never, once every year or two, a few times a year, one or two times a month, once a week or more)

Three of the participants went to the theatre regularly (at least once a month). However, of the other participants, seven had very little prior experience of theatre (one or two visits only), and fifteen did not recall any previous visit to a theatre.

Have you previously attended any audio-described performances? (if so, where?)

Only the three participants who regularly visited the theatre had previously attended an audio-described performance. One participant had experience of audio description for theatre at a large number of venues nationally. One participant had experience of audio description for theatre at the Arena Theatre and two other regional venues, and one participant had experience of audio description for theatre at the Arena Theatre only. The interview then moved on to questions around the performance itself.

Did you take part in the touch tour today? (what influenced your decision to take part or not take part?)

All participants decided not to participate in the touch tour offered before the start of each performance. Some of the reasons stated were social: six participants commented that they valued the pre-performance time as an opportunity to chat to friends, and another three participants commented that they used the time to enjoy a drink. However, ten participants stated that they had mobility difficulties or experienced discomfort while walking or standing ("I would struggle to stand", "I was worried about how difficult it would be to get to the stage"), and that this discouraged their participation in the touch tour.

What was your overall experience of the play?

One participant commented that she did not enjoy the subject matter of the play ("too dark"), but other participants were more positive. Three participants commented that they found the play pertinent or personally resonant ("it moved me to tears"), and fifteen participants suggested that they had enjoyed the performance overall ("fantastic", "I loved the play in its entirety", "a really good experience").

How do you feel about the use of audio description in the X half of the play?

One participant commented that he generally liked the audio description and found it useful, but felt that the audio describer could be cast in a similar way to an actor ("it's dependent on the right voice for the play"). Two other participants nodded in agreement. Nine participants made negative comments about the amount of time needed to setup and test the audio description equipment, but found the description itself to be useful and enjoyable. Five participants commented that they had doubts about the correct functionality of the audio description equipment during the performance. For instance, one noted that "it took ten minutes of the play for me to be sure that all of the description was coming through." Another commented that "there seemed to be an echo coming through at times."

How do you feel about the use of a soundtrack in the X half of the play?

Participants tended to use emotive terms to describe the soundtrack. For instance, one participant described the soundtrack as "eerie" and another described it as "atmospheric." The latter participant also noted that "It made the experience…. more colourful."

Overall, do you have a preference for either the audio description or for the soundtrack?

Nine participants expressed a preference for audio description, nine participants expressed a preference for the soundtrack, six participants had no preference, and one participant did not answer. One participant commented that "the ideal would be a combination of audio description and soundtrack."

How did you feel about not having to wear a headset/headphone to experience the X (soundtrack) half of the performance?

One participant praised the clarity of sound delivered by headphones compared to loudspeakers, but another commented "I hate the way headphones cut you off and cause you to miss other things that are going on around you [….] there's a much greater freedom without headphones on." The audio description headsets were also described as "fiddly" and "awkward to use" by one participant, while another stated "I really prefer not to have to wear headphones. They never fit properly and hurt my ears after more than a few minutes."

6 DISCUSSION AND FUTURE WORK

Responses suggest that participants tended to enjoy some aspects of audio description for theatre, but are sometimes dissatisfied with the technologies used in its delivery and associated issues around experience and comfort. These issues appear to be reduced or resolved by the use of a loudspeaker-diffused soundtrack, as this significantly reduces the need for audience involvement in the pre-performance setup, and also avoids encumbering the audience during the performance. That the soundtrack is tightly integrated with lighting cues and triggered by the same show technician not only aids audio-visual synchronicity, but also removes the need for any extra personnel (company cost can be a significant factor in determining viability).

Participants also appear to relate to the soundtrack differently to audio description, in particular using more emotive language. Indeed, the natures of the soundtrack and audio description are so fundamentally different that, as one participant implied, the two may ultimately be complimentary, or at least able to be used in a complimentary way. For instance, it's possible to conceive of an integrated approach that uses a mixture of Foley and audio description for literal information, and music for emotive content.

Figure 3. The banked seating in the main house at the Arena Theatre. Access to the stage for the purposes of a touch tour is via the stairs on the left of the image or via a lift (not seen).

Beyond the performance itself, that mobility difficulties hindered participation in the touch tour highlights how a broader and sometimes complex interplay of body and architecture can impact audience experience. This is closely related to the historical tendency of theatre design to treat audience and audience needs monolithically: while great strides have been made in terms of accommodating diversity, this has typically been achieved through adaptation of, or adding onto, the existing architectural fabric. Thus, these adaptations are often compromises (or compromised). However, if diverse audience needs can be understood, and space and performance are designed from the start with these needs at the forefront, more seamless and immersive experiences are surely possible. For instance, as opposed to a conventional banked theatre layout (Figure 3), a flat, single level space that offers no physical barrier between performance and audience could help to make a touch tour more accessible for people with reduced mobility.

It is also possible to imagine the touch tour being extended to include the soundtrack. For instance, transducers could be embedded into the set or props so that they become physically activated by sound, thereby extending the range of tactile sensations that can be produced. Similarly, small loudspeakers could be embedded into the bodies of props so as to produce localised sonic "point sources" that help to explain the changing layout and orientation of the space in which they are used.

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