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## Research at Trinity Laban

**Playing the Bridge: exploring the sonic potential of Hull's swing bridge as a giant musical instrument**

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**BRIDGE: The Heritage of Connecting Places and Cultures, 6-10 July 2017**

Document Version: Accepted Manuscript

Version number: 1.00

Acceptance date: 2017-11-21

Published date:

Deposit date of initial version: 2018-01-08

## **Playing the Bridge: exploring the sonic potential of Hull's swing bridge as a giant musical instrument**

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## Introduction

The paper presents the intentions and outcomes of 'Playing the Bridge', a commission carried out as part of Hull 2017 UK City of Culture, which allowed members of the public to explore a unique sonic experience of the city's new Scale Lane Bridge. The event, in early 2017, consisted of a series of workshops, performances and an audio-visual installation that took place primarily on or inside the bridge. These allowed members of the public direct access to explore the bridge's physicality and hidden engineering, and to actually play the massive steel structure as a giant musical instrument.

The multi-disciplinary project was organised by Nye Parry (composer), Jonathan McDowell (architect lead for Scale Lane Bridge) and Madi Boyd (artist), with Hull Music Service, Hull Community Gamelan, York University Music Department and Hull University Creative Music Technology programme. It was commissioned and supported by City of Culture's Creative Communities Programme in partnership with the Big Lottery Fund.

In line with the Creative Communities Programme's mission to "champion ideas large and small, that are adventurous and unique and (most importantly) connect communities to create incredible experiences and iconic memories"

(<https://www.hull2017.co.uk/guides/creative-communities-programme/>) the project aimed to transform people's experience of a major piece of civic architecture and reinforce its cultural presence for the public.

By drawing on a tradition of music, Indonesian *gamelan*, which is innately communal and one in which communities are strengthened by the shared experience of coming together at a specific place to create music by hitting metal percussion, we were able to foster a new relationship between participants and their bridge through the workshops and performances.

Following on from this act of 'playing the bridge', an audio-visual installation extended the re-contextualisation of the architecture to encompass both the history of the bridge's construction and the hidden mechanics of its operation. Using sounds from the workshop, the installation revealed the materiality of the construction in a direct and physical experience while imagery that drew on construction photos and computer emulations of the mechanical parts encouraged visitors to place themselves into the process of bridge building and yielded an understanding of the scale of the engineering project.

The project consisted of 4 phases, which were attended by over 5000 people:

1. Weekly workshops introducing people to playing Javanese *gamelan*
2. A weekend of workshops in the bridge itself, focussing on
  - a) creation of a new piece of music using the bridge steelwork as a giant musical instrument
  - b) investigating the acoustics of the space and recording sounds to be used in the installation
3. An afternoon of performance presenting the results of the workshops, featuring live traditional *gamelan* music played on top of the bridge and the new Playing The Bridge composition played inside the structure.
4. An audio-visual installation inside the bridge using sounds recorded in the bridge, oral history interviews with people who built the bridge, construction photos and computer generated video realisations.

## The setting: Scale Lane Bridge, Hull



Scale Lane Bridge (photo copyright Tim Soar)

Scale Lane Bridge is a new pedestrian swing bridge over the River Hull in the centre of the city that was completed in 2013. As well as improving connection between the city centre and the under-developed east bank, the new bridge acts as a focus for riverside regeneration and creates a memorable new civic landmark for people to enjoy the river. Uniquely the design allows people to ride on the bridge while it actually rotates, and is believed to be the first bridge in the world to do so. Scale Lane Bridge has already become a cultural destination and visitor attraction in the city.

The commission to design and construct the bridge was won through an open international competition by a team including architects McDowell+Benedetti (project lead: Jonathan McDowell), Alan Baxter Associates (structural engineers) and Qualter Hall (design/build contractor and mechanical/electrical designer). The project, for Hull City Council, was funded by Yorkshire Forward and the Homes and Communities Agency (HCA).

The bridge provides more than just a bridge connection across the river: the design creates a memorable new public place at this previously neglected but key point in the city. The distinctive curving form of the 60m long structure recalls Hull's maritime heritage. It creates a series of opportunities for people to enjoy being on the river, providing a choice of generous stepped and sloping routes, varied vantage points and places to sit, as well as a large circular space inside the bridge hub that is designed to house a café. The Playing the Bridge events took place on the upper level terrace and within the interior space.

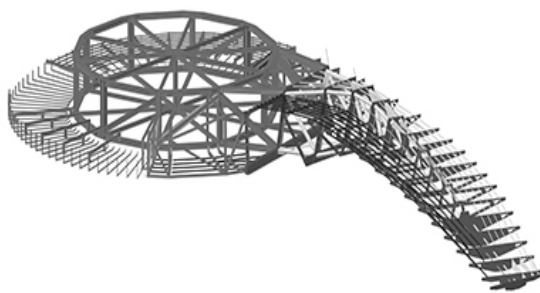
As well as opening to allow larger boats to navigate the river, the bridge is opened at scheduled times by the city council to allow visitors to enjoy the experience of the ‘ride’ over the river.



Scale Lane Bridge opening sequence (photos copyright Tim Soar)

The bridge project also included new landscaped public spaces at each bank, connecting back into the city’s urban fabric. A public art installation, developed with artist Nayan Kulkarni, spreads across both bridge and public spaces to add further layers to people’s experience. This installation consists of text embedded in the ground and a subtle soundscape of birdsong emanating from concealed speakers around the space. The programmed sound and light systems are also utilised to signal and dramatize the opening movement of the bridge.

The 350t steel structure consists of a 40m curved spine cantilevering from a 16m diameter 3-dimensional braced hub. The spine is a hybrid structure, part diagrid and part shell. Steel plates clad the surface of the walkways whilst horizontal bracing provides additional longitudinal stiffness. The hub acts as a counterbalance to the cantilever span, with braced columns connected to horizontal steel ‘wheel’ structures at both levels and 650t of reinforced concrete ‘kentledge’ built into the floor and roof slabs. The electrically driven bridge rotates on a circular track concealed between hub and pintle below.



Structural model (Alan Baxter Associates)



Inside hub space (copyright Matter Architecture)

Since it opened Scale Lane Bridge has been widely published in the UK and abroad and has won numerous prestigious awards. It has become an important civic space in the city and has been the setting for a variety of public events and art installations. These include Spencer Tunick’s ‘Sea of Hull’ (2016), the city’s annual Freedom Festival, and the Rugby League Challenge Cup fifth round draw (2015).

At the time of the Playing the Bridge event the café space inside the bridge was not fitted-out or occupied so the empty the 250 sq.metre circular space was available to give the public access into the bridge and to its exposed steel structure for this event.

### **The *gamelan* tradition and Scale Lane Bridge**

The notion that there might be opportunity to explore using the bridge as a musical instrument was informed by Scale Lane Bridge architect Jonathan McDowell's knowledge as a long-time player of the music of the Indonesian islands of Java and Bali. Central to the rich and varied music of these islands is the *gamelan*, a form of percussion ensemble consisting of tuned gongs and metallophones which are struck with wooden beaters to produce rich and complex music. The bridge's complex structure, with its metal components of different size and weight, has similarities to the varying sized metal keys and pots of the *gamelan*, albeit accidentally and at a more massive scale.

In this section we describe features of the *gamelan* tradition that have a direct bearing on how we approached the Playing the Bridge project. For a more general introduction to the music of Java and Bali see e.g. (Gold 2005) (Sorrell 1990) (Tenzer 1991).

#### *Music and the community*

The music of Java and (particularly) Bali is inherently based in local communities and is central to their sense of belonging. In line with the Creative Communities Programme's mission to "work with and engage people in Hull to celebrate the city and challenge perceptions" (CPP Guidance Notes), we set out to use the opportunity presented by Hull's 2017 UK City of Culture celebrations to work in the community to transform people's perception of this major civic landmark and to help them take ownership of their environment through sound and music.

Indonesian music is particularly pertinent to this as it is inherently social in a way that emphasizes collaboration and group activity. This could of course be said of most group music making, however the very nature of the *gamelan* as an instrument singles it out from other musics. Neil Sorrell writes:

An important distinction is often made between the *gamelan* and the Western symphony orchestra. The *gamelan* is a set, housed in a special place. The players come to it empty-handed and depart likewise. They will probably remain anonymous, whereas the set of instruments will usually bear a name - a personality which is special to it and serves to identify the whole musical event. (Sorrell 1990, 19)

In other words the *gamelan* is not defined by the players, in the way that a band or string quartet may be, but by the instruments themselves, whoever happens to be playing them at the time. Each *gamelan* is built as a unit, with intricate carvings that relate all the instruments together. Each also has unique timbral characteristics and importantly a unique tuning, which is not standardised but varies from set to set. The tuning is therefore a characteristic of each individual *gamelan*, so a particular set may be particularly prized for the sweetness of its own tuning.

It is therefore useful to conceive of the *gamelan* not so much as a collection of instruments but rather as a single multi-player instrument. This is also reflected in the attitudes to performance, where players are usually uniformed and often choreographed with military precision. These conventions serve to lessen the individuality of the players, making them subservient to the common goal of the musical performance. They are not so much playing their individual instruments as collectively playing the *gamelan*. A personal experience also underlines this view. A leading Balinese musician (Pak Nengeh Susila) commented to Playing the Bridge composer Nye Parry that he preferred one of his *gamelan* pieces to another because the players in the latter did not play as one body but were acting individually.

In the Playing the Bridge project we have taken a similar view of the Bridge as a single sound-producing structure performed on by a large group of performers – the bridge as a giant instrument! Even further in the case of this particular bridge, the ‘instrument’ surrounds and contains the audience. This promotes a strong sense of collaboration and community among the musicians, furthering our aim to produce a unique relationship between the community and the architecture.

In Bali the idea that *gamelan* music serves the community is fundamental to the civic structures of the island. Michael Tenzer describes the role of the *gamelan* in the local ‘Banjar’:

Being a musician is primarily a voluntary public activity, centred around a communal space: the *balai banjar*, or community meeting hall. Here is where the instruments are kept, where the group meets and rehearses, and in many instances where it performs too. People gather at the *balai banjar* to play *gamelan* for the pleasure of working hard together with their co-villagers to make something artistically satisfying and then enjoying the pride and sense of accomplishment of having done so. Making music without the challenges and rewards of group effort would be considered a pointless and unfulfilling chore to a Balinese. (Tenzer 1991, 104)

Obtaining a new *gamelan* is a matter of civic pride (and considerable expense) for the community. It is not too far-fetched to make an analogy with a civic monument such as a bridge. Playing the Bridge sought to use music inspired by the *gamelan* tradition to create a more personal relationship between the community and its architecture by re-casting (!) the bridge as a gamelan-style instrument allowing the community to create and experience a collaborative musical work centred on the structure.

In playing the bridge the community spirit of Indonesian music served as a model. A group of musicians from the community came together to perform on a single instrument, the bridge itself. The music was created on and for the instrument and each player served as a cog in the machine rather than taking solo roles or asserting undue individuality.

### *Parallels between Gamelan tradition and Playing the Bridge*

Everything in Indonesian music, the musical structures themselves, the way they are taught, the way they are presented in performance, reflect this community spirit and many techniques and practices in gamelan music were taken over into the various

phases of the playing the bridge project. The following table summarises some of the parallels between our approach and the music of Java and Bali:

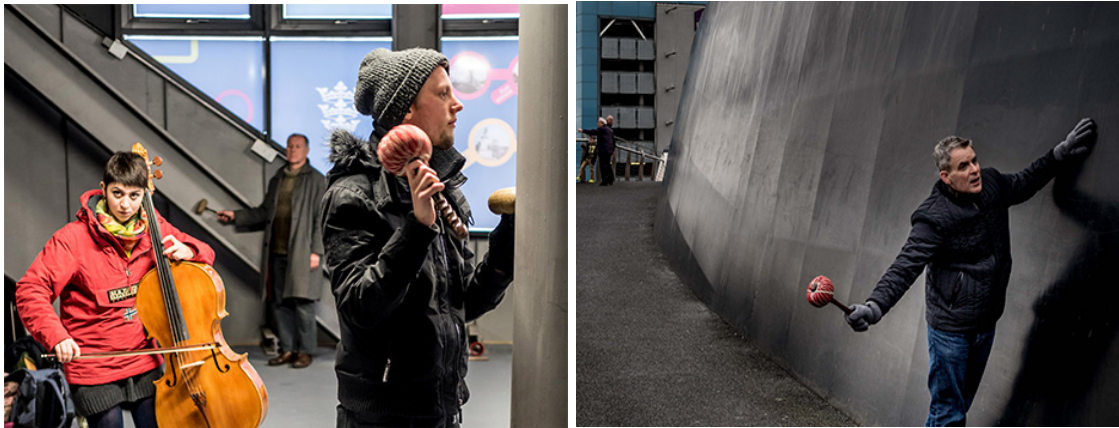
<b>Indonesian <i>gamelan</i></b>	<b>‘Playing the Bridge’</b>
Based in local communities ( <i>banjar</i> )	Based in local community
Many people play a single <i>gamelan</i> (conceived as a whole individual instrument)	The bridge is considered as a multi-player instrument with audience and players inside the resonant chamber
Music is memorized and taught by rote	Music is memorized and taught by rote
Music is focused on and structured by percussion extended by other forms of instrument ( <i>suling</i> (wind), <i>rebab</i> (string))	Music is focused on and structured by percussion extended by other forms of instrument (The Assembled ensemble’s wind and string instruments)
Musical techniques include cycles and interlocking parts	Musical techniques include cycles and interlocking parts
Sounds created by striking metal (mainly bronze), with beaters	Sounds created by striking metal (mainly steel), with beaters
Different frequency ranges represented: Low frequency gongs played with soft beaters, higher frequency metallophones played with hard beaters	Different frequency ranges represented: Low frequency steel plate panels played with soft beaters, higher frequency columns and beams played with hard beaters
Gongs produce definite pitches with complex enharmonic overtone series	Steel panels produce definite pitches with complex enharmonic overtone series
Pitches of the <i>Slendro</i> scale appear to be based on the enharmonic overtones of the gong-chimes	Pitches used in the performance and installation derived from analysis of the overtones of the played structure

Table 1: Parallels between *gamelan* tradition and the use of Scale Lane Bridge in ‘Playing the Bridge’

These parallels are manifested in different phases of the project to differing degrees and will be discussed below in relation to the workshops, performances and installation. The most obvious link with Indonesian music is of course the actual use of a *gamelan* in the workshops and the performances at the bridge.



## The Workshops:



Participants at the Playing the Bridge workshops (photos copyright Richard Duffy-Howard)

### *Weekly Gamelan workshops*

One of the starting points for the project was that it should allow wide community engagement on a range of scales and in a range of activities. The programme was devised to allow people to give different degrees of commitment to the project: from audience member, to weekend workshop participant, or regular commitment to the *gamelan* workshop group.

The latter was set up and mentored by local musician Laurence Rugg, who has a wealth of experience running workshops with people of all ages, backgrounds and abilities. He has worked in the community as a conductor, facilitator and teacher, working with choirs, orchestras and making a specialism of work with Javanese *gamelan* which he has taught in schools, prisons and community centres. The *gamelan* used for workshops, Hull Community Gamelan, is a set of instruments that belongs to Hull Music Service and is permanently housed at the Albermarle Music Centre in the city.

The *gamelan* workshops ran for 10 consecutive weeks in the run up to the performance event. The music covered included traditional *gamelan* pieces (*Kotek* and *Kendang Bubra*), as well as a new composition by Rugg and some structured improvisation. This marks a departure from traditional practices where improvisation is unusual, and reflects the fact that most of the group were entirely new to *gamelan* and able to use improvisation to master some of the playing techniques, such as damping and getting a good tone with confidence, as well as allowing them to bring previous musical experience with other forms of music making to bear on their communal experience.

Workshop participants were drawn from Hull University and local music groups, covering a range of ages from teens to 60's.

Hull City of Culture Volunteers attended these workshops (as well as the subsequent workshops, performance and installation) to act as stewards but were also specifically encouraged to be active participants in all three in order to help ensure a wider embedding of the experiences within the community.

### *Weekend Workshops on Scale Lane Bridge*

The first events at the bridge itself were the weekend workshops on 25<sup>th</sup> and 26<sup>th</sup> February 2017. These were open both to members of the public who wished to participate in the performance event (scheduled for the following month) as well as to anyone who just wanted to see what was going on and maybe join in briefly. Due to extensive media coverage in the run up to the event a considerable number of drop-in participants turned up, particularly on the second day.

### *Day 1: the Composition*

The first workshop was devoted to exploring the sounds that the bridge could make and to the composition of a devised piece intended for the subsequent performance.

In addition to members of the public we were joined by York-based performance group The Assembled who, in order to complement the metallic percussion sounds of the bridge steelwork, brought western or at least non-Indonesian instruments (cellos, clarinet, flute, Indian Harmonium, violin and laptop). Unlike in a western classical ensemble, where percussion serves mostly as decoration and punctuation of a structure based on the melodic instruments, we took the lead from *gamelan* where percussion provides the foundation and other instruments (*Rebab*, *Suling*) provide supplementary decoration.

The piece grew out of the sounds of the bridge's structure being struck with *gamelan* beaters. Participants first freely explored the bridge interior, trying out the sounds that could be produced from different parts of the steel structure. Large padded beaters were used to strike the larger steel panels in the manner of the large Javanese gongs. Harder beaters, normally used for metallophones were used (with added cloth padding) on beams, columns and struts to bring out higher harmonics.

Under the direction of Nye Parry and through group discussion a loose structure and sequence of semi-improvised assemblies of sounds were agreed for the subsequent performance.

The overtone structure of the metal plates and members gave rise to the pitches used by the instrumentalists from The Assembled, who tuned their pitches to the most prominent audible harmonics to complement the resonance of the space. Even this has a strong parallel in the music of Java and Bali. It has been suggested that the unusual intervallic structure of the Javanese *slendro* scale arises in part from the enharmonic overtones of the gongs and (particularly) gong chimes (Sethares 1998).

Some Indonesian techniques were used to structure the music, including rhythmic cycles and melodies formed by interlocking parts split between different musicians. These allowed the music to be more easily memorised as was learnt aurally and without any form of notation (again as in Indonesia).

### *Day 2: Recording*

The second day of workshops was attended by sound recordists from the Hull University Media School's HEARO research group. Using members of the public to create sounds on the bridge structure we were able to gather material that would be processed to form part of the subsequent installation. Of particular interest was the

ability to record impulse responses of the highly resonant circular hub space, which serve as a fingerprint of the acoustic and resonant frequencies of the bridge.

## The Performances



*Gamelan performance on Scale Lane Bridge (photo copyright Richard Duffy-Howard)*

The performances took place on the (luckily warm and sunny) afternoon of Sunday 26<sup>th</sup> March 2017, and consisted of two halves: a performance of Javanese *gamelan* which took place on the bridge's upper terrace, followed by a performance of the 'Playing the Bridge' piece which had been devised in the earlier workshop and which took place inside the bridge's circular hub space.

A diverse audience of around 200 people attended the informal performance, from babies to pensioners and including people from the local community, visitors who had travelled from as far away as London for the event and some who happened to be walking by and joined in.

### *Javanese gamelan performance*

The first part was performed on York University's *Gamelan Sekar Petak* which was set up under a marquee on the bridge's upper deck roof terrace. The Hull Community Gamelan group, consisting mainly of beginners who had participated in the weekly *gamelan* workshops, first played some simple traditional Javanese pieces as well as an improvised piece devised by Lawrence Rugg to illustrate different tones of the *gamelan*.



That was followed by a group of more experienced York University music students, under the direction of Neil Sorrell, playing a variety of more complex Javanese *gamelan* pieces.

At the end of the performance the audience were invited to ‘have a go’ and a wide range of people, from children to community police officers, enjoyed the opportunity to play on the *gamelan*, getting hands-on experience of creating music through percussive striking of metal instruments.

These introductory experiences of *gamelan* provided a clear ‘bridge’ between an established refined musical tradition and the more experimental act of Playing the Bridge that followed.



The audience had the chance to play on the *gamelan* (photo copyright Matter Architecture)

### *Performance of ‘Playing the Bridge’*



Performers ‘playing the bridge’ (photos copyright Richard Duffy-Howard)

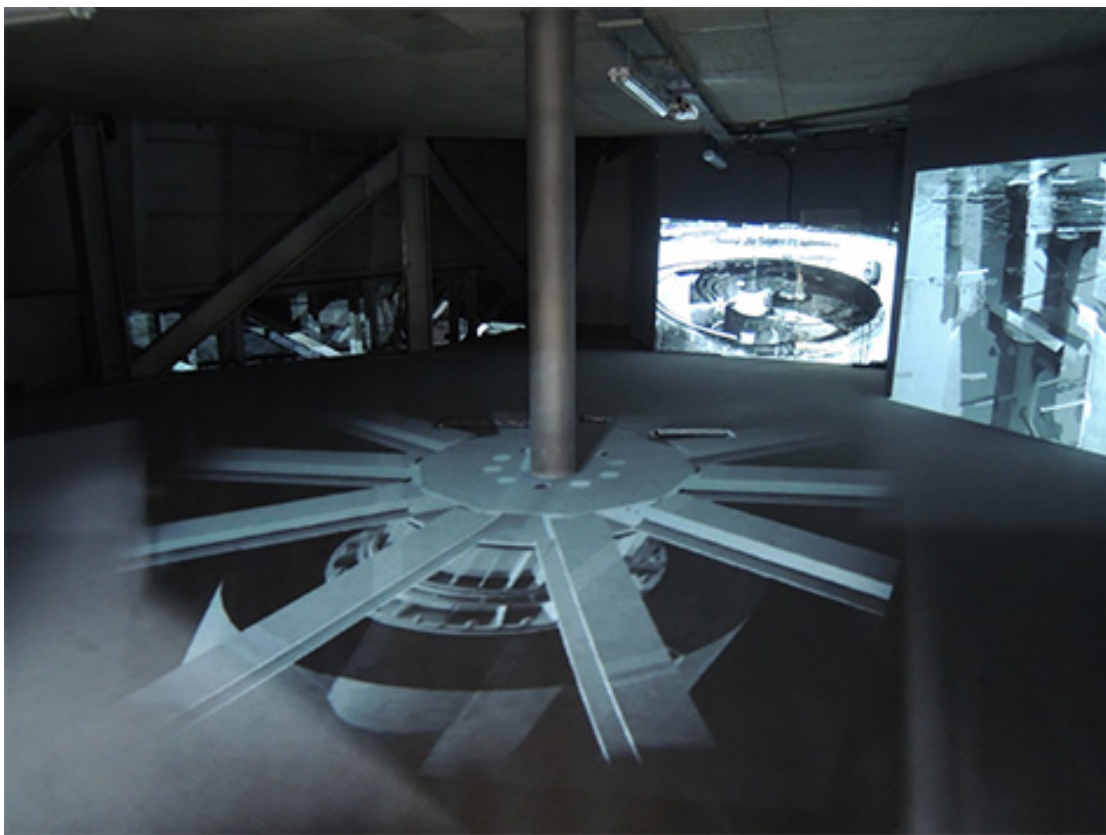
After a short break, the Playing the Bridge piece, which had been devised in the earlier workshop was played inside the bridge hub. The circular 250 square metre space allowed an audience of about 100 as well as the 30 or so performers.

The 10-minute piece was played by performers striking the bridge’s structural members that enclose the space. In this way the audience were literally standing *inside* the massive instrument to experience its sounds and physical presence. Meanwhile

members of The Assembled mingled with the audience wandering around the space, supplementing and enhancing the resonances of bridge sounds on their non-gamelan instruments.

The performance was concluded by both performers and audience processing up onto the bridge terrace above where the large Javanese gong was struck to end the piece, bringing the worlds of *gamelan* and the bridge together in a single gesture.

## The Installation



Overview of installation inside bridge hub space (copyright Matter Architecture)

The project culminated in a month-long installation by artists Madi Boyd and Nye Parry inside the bridge's hub space. The installation was intended to add another layer to the public's engagement with the bridge by revealing some of the hidden aspects of its engineering and exploring the processes of construction through sound and image. The exposed bridge structure that encloses the hub space also provided the primary material for the sound of the installation, which combined audio from the workshops with sounds related to the building and mechanism of the bridge.

### *Visual content of the installation:*

The installation visuals consisted of four areas with projected images. The room was blacked out and the projections provided the only illumination. The images were

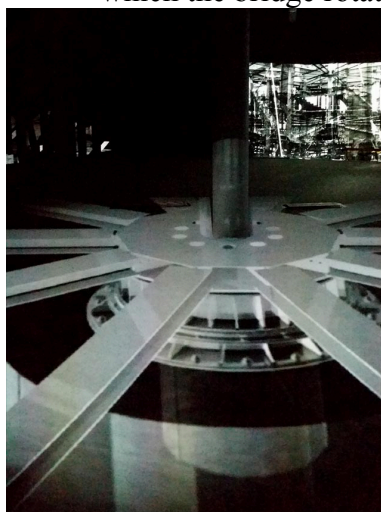
projected directly onto the surfaces of the structure: onto the floor around the central column, onto screen walls and onto exposed steelwork. The imagery fell into three basic categories:

1. Collage images of the bridge's construction:  
Photos of the construction of the bridge, provided by the architect and by Qualter Hall (the main contractors for its construction), were used by Madi Boyd as the basis for four sequences of slowly changing collages. These were projected in randomized orders on two walls. The imagery was mostly black and white with some striking regions of bright colour.



Bridge construction image (copyright Madi Boyd)

2. 'X-ray' images of the bridge workings:  
Images of the hidden mechanical and structural installations that support the bridge were projected onto the surfaces that conceal them, acting somewhat like X-ray views to allow people to 'see through' the skin. These computer-generated images were derived from the bridge's 3D fabrication model by Matter Architecture and Madi Boyd. The main image, constantly rotating around the central column, showed the actual central bearing directly below around which the bridge rotates.



Rotating projection on hub floor  
(photo copyright Matter Architecture)

3. The river:  
An area of exposed complex supports was illuminated with moving projections of water, which appeared as reflections of the river beneath the bridge.



Moving water imagery projection on structure  
(photo copyright Madi Boyd)

### *Audio content of the installation*

Sound for the installation echoed the visual themes of construction and mechanism using a number of sound sources:

1. Recordings of the mechanism:  
The sounds of the bridge opening mechanism were captured in the sound recording workshop and used in the soundscape.
2. Reminiscences of bridge construction workers:  
Fragments of oral history from some of the people who had built the bridge were recorded at Qualter Hall's works. While the acoustic of the space made intelligibility a problem at any significant distance from a loudspeaker, it was felt that the presence of the voices of the men who had worked on site complemented the construction imagery. Material included lists of names and brief descriptions of the challenges of construction.
3. Sounds of bridge construction process:  
These were captured at the Qualter Hall works and were used to evoke the building of the bridge.
4. Sounds from the workshops:  
Pitched sounds created through the workshop process of members of the public striking surfaces with *gamelan* mallets were used both in raw form and using a process in which individual overtones were isolated and looped to create a bed of pitched drones.

Another sonic dimension was provided by the public who were encouraged to play the bridge themselves when visiting the installation, using the padded wooden mallets provided or whatever other means they chose to add their own sounds. This could get somewhat overwhelming and discretion was required from invigilators but some visitor feedback (see below) confirms both the popularity of this and the way it allowed members of the public to explore a new relationship with the space.

## Public response to Playing the Bridge

Attendance records show that 5435 people visited the installation event, with hundreds more attending the workshops and performances. Comments by word of mouth, on social media, and noted in the visitors' comments book were varied but almost universally positive. A selection of remarks below, noted in the comments book, indicates five key areas of interest for the general public.

### 1. the use of sound and projection:

"Lost myself for a bit. Wonderful"

"This is such a Powerful moving experience, to be able to see the movements with projection"

"Very different! Innovative and thought provoking"

"An atmospheric experience, wonderful to experience this piece about the Scale Lane bridge in the structure itself"

"Surreal experience, very interesting and informative. Great piece of history captured"

### 2. the opportunity for hands-on interaction with the civic structure:

"Really cool. Loved making sounds!"

"Enjoyed use of space and sound enabled you to play with your own sounds."

"Love it- total playfulness and a delightful place to make noises – the interplay that (sic) the film and music ranged from majestic to ethereal – adding my own voice and noise with drumming things was ace"

"Great innovative idea, got the boys participating in a piece of artwork, great stuff!"

### 3. insight into the construction and engineering of the bridge:

"Enjoyed hearing the construction of bridge. More than a bridge 'A Work of Art'."

"So easy to just see this without thinking about the complexity of its design and building. What a wonderful experience."

"Very interesting from an engineering meets art perspective!"

"Brilliant installation. Industrial heritage as art. Thank you"

### 4. the wider culture of the city, and of City of Culture:

"It's wonderful that people visiting Hull are able to gain a taste of its history, people and its very unique and wonderful culture! Well done!"

"Fascinating translation of experiences of residents and the city into a poetic exploration and new vision of a construction that defines the city!"

"Really interesting and intriguing- sense of place!"

"Visiting City of Culture and blown away by "Playing the Bridge"- a real city of culture experience, thank you. Hull is lovely too"

### 5. the possibilities of further cultural events related to the bridge:

"Interesting installation and space- hope it becomes a widely used community space".



“Great space for further installations”  
“There should be more of this sort of thing”

## **Conclusion**

The Playing the Bridge project was designed to broaden people’s experience of the landmark structure through different levels of engagement and commitment. Workshop participants were able to share an experience of the space through musical participation and for visitors to the installation the space was opened up through projection and sound. For all those who will return to the site it will, we hope, remain much more than just a crossing.

Encouraging people to enjoy physical hands-on engagement with a civic structure was a key factor in forging a new relationship with the architecture, allowing participants to explore the bridge’s physicality, its sound, weight and materiality directly. Visitors could see inside to experience its structure and engineering; experiencing stories and images of how the bridge was made while simultaneously exploring the boundaries of music, sound and noise; enjoying a memorable opportunity to play a giant musical instrument that you can stand inside; while reinforcing the bridge as a public place for people to enjoy and deepening its cultural presence in the city.

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