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STONEHENGE RITUAL SOUND

The team are interested in creating experimental multimedia archaeology artworks that provide a phenomenological exploration of archaeological sites. They set out to create an accurate digital replica of Stonehenge as it may have looked several thousand years ago. They draw on Johnson's ideas of ecological understandings of perception, in which we perceive through a combined act of looking and listening, and thus want to produce works that have sonic content as well as visual imagery. Many archaeological reproductions take great care in ensuring that the imagery is as accurate as possible, but then use generic music and sound. This work takes a different approach, illustrating the dramatic sound effects possible at Stonehenge.

Research has shown that Stonehenge has complex acoustic effects present. Aaron Watson's work with David Keating showed that the current site has complex acoustic effects, including standing waves and filtering. However this is only part of the story. Half of the stones at Stonehenge are missing or fallen. This project aimed to create an accurate digital model of what the last phase of Stonehenge looked like when all the stones were present. Digital modeling was also used to create an accurate acoustic model of the sound of the space.

THE FILM

The project imagines a musically based ritual happening within the stone circle, on the winter solstice, at sunset. This, rather than the summer solstice, is the time that archaeologists tell us was the most significant at Stonehenge in prehistory. Members of the Stonehenge Riverside Project, led by Mike Parker Pearson, gave us insight into prehistoric activities at Stonehenge.

The project imagines a group of people travelling from Durrington Walls, where they had watched the sun rising, to Stonehenge. Walking up the avenue, to watch the sunset as an important moment in the rituals surrounding the winter solstice, a day of the ancestors, of the dead, one can experience what they might have seen and heard as they approached.

The light is dim as sunset approaches. It is the shortest day of the year. The sun has been falling away, the moon, the night, the darkness has been winning in the battle of the skies. But today is a day of hope, a day marking the return of the sun (later Christians would mark the birth of the sun at the same time of the year). In the distance a group of people are making sounds in the stone circle. As we approach these sounds become clearer, changing as we move forward.

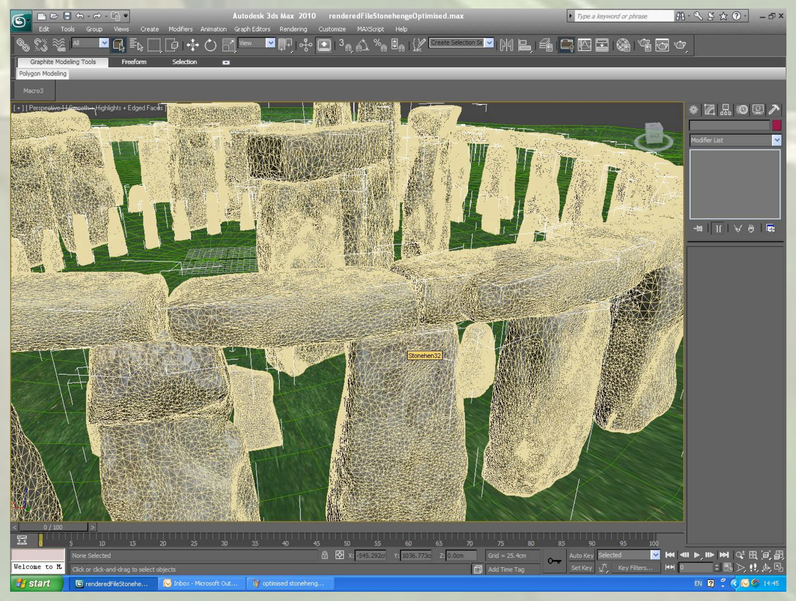
Stonehenge comes into view up the hill as we walk up the avenue, the ritual approach to the site. We walk to the heelstone, pausing to hear strange echoes, before walking up to the stone circle. Entering the circle the sound changes dramatically, enclosed by a ring of Stone. It is like being in a cave, but with the sky open above. The stones seem to have voices, adding their own sound to that made by the musical participants inside.

We approach the centre of the circle, and then our spirit rises up into the sky, soaring around the space. Finally we come back down to earth before leaving the way we came.

The making of it

Stonehenge seems to be about the ancestors, the dead and their spirits, and ethnographic research suggested that a relevant ritual might involve trance, some kind of journey of the soul and consciousness, triggered by repetitive music and dancing. This fits in with concepts of Stonehenge as a site of healing, which again may have involved possession or shamanistic trance.

We knew from stone chips found in the space that Stonehenge was often filled with the percussive sound of stone on stone, as well as antler on stone and earth. We knew from traditional music cultures that music is often based on physical activities and work; that trance is a universal practice; and that percussion sounds are common in ancestor rituals. We knew that echoes in the space encourage one to play at a very specific tempo (78bpm), in time with echoes, and that the space adds a double time repeat, producing a 156bpm feel. We knew that prolonged dancing at such a tempo could cause heart rates of a very similar speed, aiding entrainment and entrancement. We had also discovered that playing in time with the echoes in the space could set up very low frequency standing waves (at 48Hz), inside the circle, a low audible hum, and a sound like thunder, something that would not normally be heard in prehistory without rain. This echoed the archetypal thunder god found in so many cultures, including that of those who carved his hammer symbol on Stonehenge's sarsen stones.



We therefore created a percussive sound playing inside Stonehenge, and illustrated how this sound would change as one approached the space using modeled impulse responses. We created a sound storyboard that was matched by visual digital modeling. Sounds used focused around experimental replicas made by archaeologist Simon Wyatt. This included TRB culture clay drum replicas. At Stonehenge we found that these small hand drums excited the acoustic of the space best. Other percussive sounds, voices, breathing, footsteps, a cow horn, bullroarer and a replica of the Wilsford bone flute also feature.

This sound was integrated with a digital 3D model of Stonehenge that had been made using 3d scan data sourced from English Heritage archives. We used existing stones to replace the fallen and missing ones, raising fallen stones and creating a realistic digital 3D model of the original Stonehenge site. High quality textures from photographs of the stones, taken on site, were mapped onto a 3D model of each stone. The final Stonehenge model is aligned exactly with GIS data, and placed onto LIDAR aerial laser scan data, so that during animation of the model, the ground contours are accurate. A digital film was then generated, putting together sound and image.

"This short 3D film tries to provide an immersive experience, in order to allow us to consider what it would have felt like to be at Stonehenge in prehistory."

The Team

Rupert Till. Direction and Composition. Rupert is Senior Lecturer in Music Technology at the University of Huddersfield. As a composer he has released a number of recordings, and has written music for a number of films. He has over 20 years of experience as a composer, performer and producer. His muscilogical work includes a recent book ŒPop Cult¹ published by Continuum. His work on the Sounds of Stonehenge has been published by Archaeopress and Journal@IASPM. Having led a research network on the Acoustics and Music of British Prehistory he is now editing a book of the same name.

Andrew Taylor. 3D animation. Andrew is Senior Lecturer in Design at the University of Huddersfield, also currently undertaking a PhD. His recent work explores experimental approaches to learning and teaching, which attempt to make space for the diverse experience, and tacit skills of the learner through, and around the use of real spaces, and 3D virtual interactive tools and virtual environments. Both his individual and collaborative research has been published in art & design journals and he has presented widely at UK, and at international art, design & architecture conferences. His industrial experience includes work as a design colourist and textile designer, and

Ertu Unver. 3D modelling. Ertu is Senior lecturer and specialist in 3D Design contributing on Product Design and Transport Design courses. He is a Mechanical Engineer and computer programmer and has worked collaboratively as a software developer and 3D modeler on a range of internationally exhibited research projects 'Post Industrial Manufacturing Systems', 'Future Factories' and 'AutoMAKE'. Blending code with 3D design, his work focuses on the random and customisable generation and mutation of product designs and the building of complex craft forms within user specified 3D meshes.