About Tide

Peter Ride

Artistic Director, DA2

There are many experiences we cannot easily communicate. Gravity is one of those. Our relationship to the earth's gravity seems straightforward, but in comparison, our comprehension of the way we experience the gravitational pull of the moon is much more complex. The pull of the moon as it revolves around us, while we together revolve around the sun, is loaded with symbolic associations: from the rising and falling of the seas to physical, spiritual and emotional cycles, lunacy and love. Take three spheres and spin them. Fill them with water and so they resonate when touched, like singing wineglasses, creating different frequencies as the water levels rise and fall. Tide, Luke Jerram's project has this breathtaking simplicity. It conveys to us a level of experience that is greater than something we can otherwise encounter. In Tide, the singing spheres suspend us in a space that evokes the changing relationship between the moon and earth. It is a true representation of the physical relationship: a highly precise measuring device, configured to register the gravitational force of the moon, sends data that is then converted into a signal to alter the water levels within the spheres.

In the constantly fluctuating audio installation that results, the moon is controlling, live, the experience that visitors have as they stand within the space. It changes gradually and perceptibly throughout the day and at the points when the moon is furthest or closest to the installation, which are the points of high or low earth-tide, spheres begin to sing at the same pitch. Luke's project draws us into space in an extraordinarily beautiful and rather mysterious way, but it also reaches back into time. Tide not only gives us a very contemporary twist to astrophysics, it also reflects back on the way we have comprehended the relationship between man, earth and the celestial spheres. In former times, music represented a sense of mathematical order to the universe, it offered the certainties that science now gives us. Through his lunar gravity sculpture, Luke Jerram enables us to experience new and complex relationships between sound and space.

Luke was awarded a DA2 Open Commission to develop Tide, an award designed to help artists develop ambitious ideas and refine them through research. Luke's project has been developed through collaboration with a range of specialists in Astrophysics, Geophysics, the History of Music and glass design. Engineers have assisted with the design of the working components of the Tide sculptures to micro-precision so that they can respond to minute changes in data. A collaboration with the Open University's Department of Volcanology has enabled Luke to work with the world leading design for gravity meters. We are indebted to the many organisations and individuals who gave him their support and interest.

THE MUSIC OF THE SPHERES

Bob Evans
Musicologist

Luke Jerram's work takes up an ancient theme, a view of the universe laid out by Pythagoras (born in the sixth century BC) and said to derive from the traditions of Egypt, Western Asia and possibly India. Plato (c. 427-347 BC) articulated this view in the Timeus and the Republic.

Pythagoras and Plato believed that an inaudible vibration of the ether is the basis of all substance. The vibration forms, in Alain Danielous words, 'permanent numerical patterns', which are the basis of the world's existence. The earth was conceived as immobile, contained within a series of nesting crystalline spheres that move freely against each other. Each sphere had one of the moving heavenly bodies (Moon, Mercury, Venus, Sun, Mars, Jupiter and Saturn) embedded in it. From the earth it was possible to observe the firmament of fixed stars beyond the transparent spheres. The swift movement of the crystalline spheres against each other was believed to generate the inaudible music of the spheres, which transmitted the influence of the heavenly bodies and the deities associated with them to the earth and its inhabitants. The earth and its atmosphere were composed of the elements: Earth, Water, Air and Fire, all of which were susceptible to planetary influence.

In the seventeenth century Iohannes Kepler tried to harmonise the ancient idea that the ordered movements of the heavens corresponded to a series of musical/mathematical relationships influencing events on earth with the newly accepted heliocentric universe and his own astronomical observations. He proposed a tune for each planet and the moon, all the tunes repeated an ascending and descending sequence; a glissando rather than a scale, each differing in compass, pitch and speed. Luke Jerram's installation demonstrates real correspondences between heavenly bodies and the earth, and borrowing the crystalline spheres of the ancients, he makes audible to us relationships between the earth, sun and moon.

TIDAL FORCE

Mark Birkinshaw
Professor of Cosmology and Astrophysics, University of Bristol

Although the gravitational pulls of the Sun and Moon are imperceptible to our bare senses, tidal effects are often important in the Universe.

The weak solar and lunar tides in the Earth's seas (and solid land and atmosphere) are subtle effects. Even including the effects of resonance, the tidal range is only one millionth of the radius of the Earth. However, this is enough to affect the design of coastal areas, to change the rotational period of the Earth, to lock together the Moon's rotation and orbit, and to cause the Moon to move away from the Earth at about an inch per year. Without the tides that caused variations in the environments of primitive organisms at the edges of ancient seas, evolution on Earth might have run more slowly than it has, and quite a different type of life might now be looking at art on our planet.

Closer or more massive bodies produce stronger tidal effects. For example, Jupiter's moon Io is squeezed so strongly by the Jovian tides that Io's interior boils through the surface in gigantic volcanic eruptions. Seen first by the Voyager 1 spacecraft in 1979, these volcanoes spew so much sulphur-rich gas into the inner part of the Jovian satellite system that they affect the intense radio emission that we detect from Jupiter's magnetosphere.

If Io had been even closer to Jupiter, or less solid, then the tidal forces could have been enough to tear it apart and create a ring of debris about the planet, like the rings that we see around Jupiter, Saturn, and Uranus. Even more intense tides can be raised near black holes. The super-massive black holes that lurk in the nuclei of galaxies are thought to be capable of ripping apart any stars that pass too close. As the debris of such stars fall inwards into the black holes, more tidal squeezing heats it to the point that it emits X-rays and gamma-rays in some of the most energetic displays in the Universe.

It is by thinking carefully about tidal forces that we understand the modern theory of gravitation, Einstein's General Relativity. While the 'pull of gravity' is an everyday phrase, it isn't as a pull that we recognise gravity today, since an accelerating object would feel an equivalent pull. The stress caused by a tide is more fundamental, and it is this stress that we relate to the structure of space-time and the presence of mass-energy.

Tide is an acoustic sculpture that responds to the gravitational pull of the moon. As the earth and the moon move around the sun, the moon exerts its gravitational force on the earth. Tide is a 'live' gallery installation where tremoring sounds rise and fall, controlled by this phenomenon.

Luke Jerram
Artist

I once videoed a ship coming over the horizon. It gave me a sense of the curvature of the earth, of my location and physical size. Our understanding of space is often defined by time, how long it takes to travel somewhere, by car perhaps or by flying. We gain an inner understanding of distance, which changes over our lifetime. Two hundred years ago this internal awareness of how far it was to America was very different to how it is now. The world is shrinking and we are able to look outside of our small revolving blue planet to consider far larger distances and much longer durations of time. In Tide, I aimed to give the viewer a sense that the work was being controlled from 'out there'.

I wanted to make a work that was physically located within a gallery but was however, far larger than the space itself. In order to measure the gravitational pull of the moon and sun, the meter I am using has to be adjusted to point straight down. It takes many minutes to calibrate, but once set, it points exactly to the centre of the earth. There are also other mental and physical lines the gravity meter helps to acknowledge: a line of gravitational energy tying the both the installation and viewer outwards, to moon and sun.

I tend to use physics as a framework to throw over a problem, to physically break down a phenomena to consider how it works. Switching between this scientific way of thinking, to the consideration of the viewer's primary experience of the artwork, has been difficult. Basing the work on Keplers theories of the Music of the Spheres I wanted to fine-tune the design of the sculptures so that the work could function both as an installation artwork and as an accurate, musical astronomical clock. In order to be able to make the work within my budget and timeframe I finally had to separate these two desires and remind myself that I was making an artwork and not an accurate work of science. For me Tide, only defines the parameters for an even more refined work.