***Dust Defying Gravity*, 2003**
16mm film transferred to DVD
dimensions variable
duration: 4 min
Collection Irish Museum of Modern Art

Grace Weir
Dust Defying Gravity

This work was filmed at Dunsink Observatory, Dublin, one of the oldest scientific institutions in Ireland. The work consists of a single four-minute long shot that tracks through the rooms at Dunsink, revealing the ageing telescopes and measuring instruments used by previous scientists displayed throughout the building. The camera moves continuously, slowly passing over a mechanical model of the solar system called an orrery. Such models were used in science to illustrate the position and movement of the planets and moons in the Solar System. Gradually, light reveals dust in the air, making visible the invisible and drawing us into a world of micro-phenomena normally undetectable to the human eye. It is perhaps at this point we become conscious of looking as these micro-worlds of dust revealed by mechanical means – in this instance film. This moment of enhanced perception links to the value of the orreries and the people who once inhabited and worked in these rooms. The sound accompanying the film is of a ticking grandfather clock which was added after the film was shot.

Grace Weir
b. 1962, Dublin, Ireland. Lives and works in Leitrim

Grace Weir studied at the National College of Art and Design, and has an M.Sc. from Trinity College, Dublin. She co-represented Ireland at the 49th International Venice Biennale in 2001 with her video installation *Around Now*. In 2006, she was awarded a residency at St. John's College, Oxford, where she spent time researching ideas which culminated in the solo exhibition *In my own time* at the Science Museum, London. Forthcoming group shows in 2012 are at the Yerba Buena Center for the Arts, San Francisco, USA; Kunstlerhaus Berlin, Germany and Museum of Modern Art, Rio de Janeiro, Brazil.

Background to Grace Weir's process

Grace Weir works primarily with the moving image, combing cinematic works with experimental videos and installations. Her practice is concerned with our experience of the world as it is lived and known on a day-to-day level. However, she opens this daily 'reality' onto new levels of experience by utilising and applying scientific knowledge and philosophical theory to question what we know and how we come to know it? Weir is also concerned with the notions of 'reciprocal action' or the relationship between the 'knower' and 'knowing'. This process of enquiry is activated by Weir through a playful questioning of existing beliefs or knowledge systems, usually by initiating conversations with other people. She achieves this by spending time researching other disciplines and working with scientists, moving easily between disciplines.

In this respect, scientists such as Robert Boyle (1627-91) and Albert Einstein (1879–1955) have influenced her work: Boyle because he believed that all experiments, regardless of discipline, should be exercised and witnessed in public. This introduces other complex notions such as 'agent' and 'agency'. Agent, simply put, means one who acts, while agency is the quality or mode of an activity. These activities can be as far reaching as digging, painting, bird-watching or reading. However, what is of interest is the context in which these activities take place and how they are influenced and controlled within different kinds of social, cultural and political environments and from different viewpoints at any given time. Weir has a particular interest in scientific practice because science, as a specialised model of practice, operates from factual evidence and/or proofs and relies on mechanical models that test out various theories under a controlled laboratory environment.

Since World War II, the emphasis in science has shifted from the hard science of physics to biological science, expanding the focus of scientific entities to *relationships*: determinism to *indeterminism* (or chaos); linear causality to *circular causality*; reductionism to *holism*; programming to *self-organisation;* and realism to *constructivism*.[1] The issue at stake was not so much the data being used but the use of appropriate models to visualise the complexity of science.

Perhaps a starting point to understanding these ideas better would be to consider how the Cartesian model – defined as a closed system of mechanised parts – considered all biological entities as isolated and closed (a practice of reductionism), whereas modern science is informed by a new model that embodies human and social relationships as relational and connected. In this sense, Weir's artistic practice opens a dialogue with science by suggesting that knowledge is relational and open to discussion.

Some questions to consider

Why do you think the artist filmed this work in Dunsink?

What kinds of relationships is the artist exploring by filming old scientific instruments, where there is no physical presence of a human being?

Do you think objects can evoke the absence/presence of the human?

How does the artist use light and movement to focus on the minute particles of dust?

What kind of mood is suggested by dust?

The sound in this film has a particular quality – can you describe the sound?

Does it remind you of anything you have heard before?

Is it clear or distorted?

Does it suggest a voice or many voices that have been simultaneously recorded?

Is the artist appealing to senses other than sight with these works?

What kinds of objects are immediately recognisable to you in this film?

Can you tell from these objects who may have worked here and what kind of work they were involved in?

Key words

CARTESIAN
Refers to the theories of the French philosopher René Descartes (1596–1650). Best known for his statement 'I think therefore I am', in his theories he placed emphasis on reason and the development of the natural sciences. He is also associated with the concept of dualism and the relationship between the mind and the body.

CHAOS THEORY
A field of study in mathematics which is concerned with the behaviour of dynamic and random systems with a view to finding order.

DISCIPLINE
Category of learning, knowledge formation or arts practice.

INSTALLATION
The configuration of objects in a space where the totality of the objects and the space comprise the artwork.

ORRERY
A mechanical device from the eighteenth century, named after Charles Boyle, the Fourth Earl of Orrery (1674–1731), used in science to illustrate the position and movement of the planets and moons in the Solar System with the Sun at the centre.

RELATIONAL
Characterised by relations – between individuals, objects, art and audience, etc.

THEORY OF RELATIVITY
Developed by Albert Einstein (1879–1955), the Theory of Relativity is concerned with the notion that time and space are relative and not fixed. This theory had a radical impact on scientific enquiry in the 20th century.

Activities

Exploring Gravity Through Art
Gravity is defined as 'The attraction between objects that have mass'. Isaac Newton (1642–1727) realised that the force of gravity, which pulls an apple from a tree, is the same force obeying the same law as the force of gravity which holds the Moon in orbit around the Earth, and the planets in orbit around the Sun.[2] Exploring the concept of gravity creatively can be considered in terms of how we apply materials to a surface. For example, normally we paint with brushes that have been dipped in to paint. In a sense, the brush controls how we paint – the speed and texture. Why not consider dispensing with brushes altogether and fill various sized containers with watered-down paint or ink, then pour the paint onto a flat surface such as card, paper or stretched canvas. Consider pouring paint from different heights and using different movements. Try walking or running around the surface, pouring paint as you go and looking at the different effects that can be created. Splash paint onto a surface, testing out the distance you stand from the surface and the kinds of marks that can be created using different types of implements.

Moving drawings
Most drawings are made holding an instrument such as a pen, pencil or brush. Why not consider making a device that holds the pen in place. For instance, I have created a series of drawings, which I call 'spin-top drawings'. I create these works by cutting out a circular form in cardboard. This can be any size – but it does have to be round. Find the central point in the circle and cut a hole through it. Use a short pencil and push through the hole so that the nib of the pencil is positioned on the underside of the circle. Gripping the pencil, flick and spin – like you would a traditional spinning top. Watch as the pencil creates a series of circular looped lines as it moves over the paper. If you have access to a video camera, record the movements of the spinning top as it draws a range of pencil patterns on the paper to create an animation piece. Different lengths of pencil will result in different kinds of lines; however, if the length of the pencil is longer than the radius of the circle the pencil will not spin.

Find or build other devices to make drawings that interest you. The force of gravity and the gentle push and pull of the pencil, paper and card act together to influence the 'spin-top model' in very complex ways. It can be very difficult to predict where the 'spin-top model' is going to go next. This sort of unpredictable motion is called chaotic motion. Scientists try to describe this order using models called strange attractors. Attractors can be strange, chaotic and steady. Diverse phenomena, such as the patterns of Saturn's rings, measles outbreaks, and the onset of heart attacks all follow chaotic, or unpredictable, patterns.

Model of a Solar System
Create your own model of our Solar System, picturing the Sun and the eight planets and dwarf planet that orbit it: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto (a dwarf planet). Nicolaus Copernicus (1473–1543) was a Polish astronomer who developed the Copernican system, a model of the Solar System in which all the planets orbit the Sun. Use card, tape, string, pencils and markers, to represent the Sun and the planets. Cut planets out of card in different circular sizes and colour code them so that each colour represents a particular planet. Make one large circular piece, from which you can hang the planets. (Mercury goes in the inner orbit, Venus goes in the second orbit, Earth goes in the third, etc.). Tape the end of the string to the top-side of the cardboard. After all the planets (and the Sun) are attached, adjust the length of the strings so that the planets (and Sun) all lie in a plane. To hang your model, tie three pieces of string to the top of the cardboard – then tie these three together. Then connect these to a longer string (from which you'll hang your model). You now have a model of our Solar System.

Pin-hole cameras and 'drawing blind'
An instrument can change the world and compel us to rethink our place in the universe. The development of instruments such as the telescope, the camera and the lens – all linked to the history and development of scientific practice – did just this. Thomas Harriot (1560–1621) was the first to use a telescope to look at the moon, but he only grasped that it was covered with mountains and craters after he saw Galileo's rendering of the lunar surface. The reason that Galileo (1564–1642) was more successful is that he brought art to the aid of science.

You don't need an expensive instrument to view the world differently. You can make improvised cameras, lenses and viewfinders from card and tape. Try making your own pinhole camera out of household items. Pinhole cameras allow light through a tiny hole, making pictures with a soft, blurred, dreamy effect (with practice, you may be able to take sharply focused photos).[3] Using your hand-made view finder or lens finder, create a series of drawings based on looking through the hole and concentrating on particular aspects of an object that you are studying. Another alternative is to get a sheet of card cut to A5 size. Push a pencil through a hole made in the middle of the card so that when you hold the pencil the card lies comfortably flat on your hand. The idea is that the card covers the sheet of paper that you are drawing on. This means that, in effect, you cannot see what you are drawing, so that you concentrate on what you are looking at rather than on what you are drawing.

Further Explorations

Grace Weir has developed a range of projects in a scientific context, using conversation as a tool to test out existing theories, particularly how knowledge as a process of mutual exchange can be transformative. Shared in context, these experiments dramatise the pragmatic interplay between the 'knower' and 'unknown' as a way of understanding complex ideas. *Bending spacetime in the basement* (2003), shows the artist with collaborator and scientist Ian Elliott setting up a scientific experiment, examining the universal gravitational pull of all objects.[4] They use everyday materials such as tin cans, lead, wood and string. The film reveals the two participants as they discuss the making of the experiment and the issues arising. Their aim is to bend space time as suggested in Einstein's General Theory of Relativity (1915). This theory examines the spatio-temporal properties of physical processes.[5] A previous work *The Darkness and the Light* (2002), also features Elliott. Here Weir documents Elliott entering a small observatory. Walking across the room, he opens the shutters letting the light in and, by doing so, he reveals the various telescopes and instruments that he uses in his work. In a later sequence, Elliott attempts to explain 'superstring theory'. This he does by continuously halving a sheet of paper with scissors until the task becomes impossible. He then projects a sunspot on the paper using a telescope until the paper eventually catches fire and burns away. As a metaphor, this exercise reveals the role and perhaps the value of failure in scientific experiments in general. *Paper exercise (2003),* consists of an unedited conversation between Weir and Elliott, as they illustrate the basis of the Theory of Relativity in a schematic drawing. The film reveals the hands of the two participants, drawing as they discuss the Theory of Relativity. There is a soundtrack, which is a recording of Elliott's voice explaining the basics of relativity, while Weir asks supplementary questions.

[1] Ludwig von Bertalanffy, 1968 *General System Theory: Foundations, Development, Applications*, New York: George Braziller, 1968.
[2] John Gribbin, *The Little Book of Science*, NY: Barnes and Noble, 1999.
[3] Full details on how to make your own pinhole camera can be downloaded from: *www.diyphotography.net/23-pinhole-cameras-that-you-can-build-at-home* and *www.makingyourown.co.uk/make-your-own-pinhole-camera.html*
[4] For further information on the Theory of Relativity see *www.virtualprofessors.com/8-lecture-course-einsteins-general-theory-of-relativity*

Further reading

publications

Grace Weir: In my own time, essays by Janna Levin, Francis McKee, London: Science Museum, 2007, catalogue/DVD

Grace Weir: A Fine Line, essays by Francis McKee, Graham Parker and Peter Ride, Manchester: Cornerhouse, 2003, catalogue/DVD

Grace Weir: Around Now, essay by Noel Sheridan, Royal Hibernian Academy, Gallagher Gallery, Dublin 2001, catalogue

'Man on Houston St.', essay by Tanya Kiang, Temple Bar Gallery, Dublin, 1996, catalogue

selected films and commissions

If only something else had happened, film installation for Apertures & Anxieties, RHA Gallagher Gallery, Dublin, 2011

In my own time, premiered at The Science Museum, London, 2007

From here to, new media installation commissioned by GMIT, Galway-Mayo Institute of Technology, 2007

Sight unseen, collaboration with Graham Parker, film commission by Breaking Ground, Ballymun, Dublin, 2005

Dust Defying Gravity, film commission Cornerhouse, Manchester, UK. Funded by the Arts Council of England, 2003

Little Bang, web-project commission by NIFCA, the Nordic Institute for Contemporary Art, Helsinki, Finland, 2001

further reading on science

James Gleick, *Chaos*, Viking Penguin, 1988

John Briggs and F. David Peat, *The Turbulent Mirror*, Harper Collins, 1990

Manuel DeLanda, *Intensive Science and Virtual Philosophy*, 2009

websites

Grace Weir
www.graceweir.com

Science Museum, London
www.sciencemuseum.org.uk/smap/collection_index/grace_weir_in_my_own_time.aspx

Sci Art / Wellcome Trust, fund to promote art/science collaboration
www.wellcome.ac.uk/Funding/Public-engagement/Funded-projects/Awards-made/All-awards-made/WTX035067.htm

Science Gallery, Trinity College, Dublin
www.sciencegallery.com

W5 Science Centre, Belfast
www.w5online.co.uk