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Chapter 1 : What is Heisenberg's Uncertainty Principle? | Science | The Guardian

The Uncertainty of Objects and Ideas: Recent Sculpture is organized by the Hirshhorn Museum and Sculpture Garden. The exhibition is made possible by the Hirshhorn's Board of Trustees with additional support from Barbara and Aaron Levine, The Audrey and Sydney Irmis Charitable Foundation, the Peter Norton Family Foundation, and the Museum's.

Alamy The uncertainty principle is one of the most famous and probably misunderstood ideas in physics. It tells us that there is a fuzziness in nature, a fundamental limit to what we can know about the behaviour of quantum particles and, therefore, the smallest scales of nature. Of these scales, the most we can hope for is to calculate probabilities for where things are and how they will behave. The more familiar form of the equation came a few years later when he had further refined his thoughts in subsequent lectures and papers. Among its many counter-intuitive ideas, quantum theory proposed that energy was not continuous but instead came in discrete packets quanta and that light could be described as both a wave and a stream of these quanta. In fleshing out this radical worldview, Heisenberg discovered a problem in the way that the basic physical properties of a particle in a quantum system could be measured. In one of his regular letters to a colleague, Wolfgang Pauli, he presented the inklings of an idea that has since become a fundamental part of the quantum description of the world. The uncertainty principle says that we cannot measure the position x and the momentum p of a particle with absolute precision. The more accurately we know one of these values, the less accurately we know the other. Multiplying together the errors in the measurements of these values the errors are represented by the triangle symbol in front of each property, the Greek letter "delta" has to give a number greater than or equal to half of a constant called "h-bar". One way to think about the uncertainty principle is as an extension of how we see and measure things in the everyday world. You can read these words because particles of light, photons, have bounced off the screen or paper and reached your eyes. Each photon on that path carries with it some information about the surface it has bounced from, at the speed of light. Seeing a subatomic particle, such as an electron, is not so simple. You might similarly bounce a photon off it and then hope to detect that photon with an instrument. But chances are that the photon will impart some momentum to the electron as it hits it and change the path of the particle you are trying to measure. Or else, given that quantum particles often move so fast, the electron may no longer be in the place it was when the photon originally bounced off it. Either way, your observation of either position or momentum will be inaccurate and, more important, the act of observation affects the particle being observed. The uncertainty principle is at the heart of many things that we observe but cannot explain using classical non-quantum physics. Take atoms, for example, where negatively-charged electrons orbit a positively-charged nucleus. By classical logic, we might expect the two opposite charges to attract each other, leading everything to collapse into a ball of particles. This means that the error in measuring its momentum and, by inference, its velocity would be enormous. In that case, the electron could be moving fast enough to fly out of the atom altogether. Alpha particles are two protons and two neutrons emitted by some heavy nuclei, such as uranium. Usually these are bound inside the heavy nucleus and would need lots of energy to break the bonds keeping them in place. But, because an alpha particle inside a nucleus has a very well-defined velocity, its position is not so well-defined. That means there is a small, but non-zero, chance that the particle could, at some point, find itself outside the nucleus, even though it technically does not have enough energy to escape. When this happens it's a process metaphorically known as "quantum tunneling" because the escaping particle has to somehow dig its way through an energy barrier that it cannot leap over it's the alpha particle escapes and we see radioactivity. A similar quantum tunnelling process happens, in reverse, at the centre of our sun, where protons fuse together and release the energy that allows our star to shine. The temperatures at the core of the sun are not high enough for the protons to have enough energy to overcome their mutual electric repulsion. But, thanks to the uncertainty principle, they can tunnel their way through the energy barrier. Perhaps the strangest result of the uncertainty principle is what it says about vacuums. Vacuums are often defined as the absence of everything. But not so in

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quantum theory. There is an inherent uncertainty in the amount of energy involved in quantum processes and in the time it takes for those processes to happen. Again, the more constrained one variable is, the less constrained the other is. These "virtual particles" appear in pairs – an electron and its antimatter pair, the positron, say – for a short while and then annihilate each other. This is well within the laws of quantum physics, as long as the particles only exist fleetingly and disappear when their time is up.

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Chapter 2 : Deborah Horowitz (Author of The Uncertainty of Objects and Ideas)

WASHINGTON.- This fall the Hirshhorn Museum and Sculpture Garden dedicates the entire second floor of the museum to an exploration of sculpture. On view from Oct. 26 to Jan. 7, , "The Uncertainty of Objects and Ideas: Recent Sculpture" features pieces by nine influential and emerging.

In the postwar period, people began questioning traditional beliefs. Some found answers in new scientific developments, which challenged the way people looked at the world. Many enjoyed the convenience of technological improvements in transportation and communication. As society became more open, women demanded more rights, and young people adopted new values. Meanwhile, unconventional styles and ideas in literature, philosophy and music reflected the uncertain times. The creation of a new Society In the wake of World War I, with its massive destruction and slaughter, many people lost faith in the Enlightenment ideal of ongoing human progress. They felt a sense of disconnection and doubt about the future. New events and ideas in Science raised even stronger doubts about the predictable nature of the world. Although the death and destruction of World War I was difficult for many people to accept, at least they understood what had caused most deaths. In the midst of fighting, however, the world was hit by a mysterious illness that caused more deaths than the world itself and showed how little doctors still understood about disease. It could kill some victims within two or three days of the first signs of symptoms which were similar to flu. Then, just as mysteriously as it had appeared, the Influenza pandemic disappeared. It is uncertain exactly how many people died from the influenza pandemic, but most estimates put the death toll over 20 million. A newspaper from Question 1. What were the social effects of the Influenza pandemic? Some looked to the ideas of Sigmund Freud, the father of modern psychology, to ease some of this uncertainty. The ideas of Austrian physician Sigmund Freud were revolutionary. Freud treated patients with psychological problems. From his experiences, he constructed a theory about the human mind. He believed that much of human behavior is irrational, or beyond reason. He called the irrational part of the mind the unconscious. In the unconscious, a number irrational impulses existed, especially pleasure- seeking impulses, of which the unconscious mind was unaware. German- born physicist Albert Einstein offered amazing new ideas on space, time, energy and matter. The brutality of World War I caused philosophers to question accepted ideas about reason and progress. Disillusioned by the war, many people also feared the future and expressed doubts about traditional religious beliefs. Some writers and thinkers expressed their anxieties by creating disturbing visions of the present and future. Finally, most writers and poets abandoned traditional literary forms and experimented new ways of writing. Written in , Spengler viewed history as a collection of many different cultures that, like living organisms, experience birth, youth, maturity and death. Western civilization, according to Spengler, had entered its final stage and that its death could not be avoided. Perhaps better than any novelist in the age, Kafka grasped the dilemma of the modern age. Kafka, a German- speaking Jew living in Czechoslovakia, was intimidated by a tyrannical father. At a young age, he contracted tuberculosis, from which he died. In giving expression to his own deep anxieties, he expressed the feelings of alienation and isolation that characterize the modern individual. Human beings strive to make sense out of life, but everywhere life itself oppresses them. They are caught in a web that they cannot control; they live in a nightmare society dominated by oppressive, cruel and corrupt leaders and amoral individuals. Many writers and poets portrayed the pessimism and uncertainties of the age. The philosophic movement that best exemplified the anxiety and uncertainty of Europe in an era of world wars was Existentialism. Like writers and artists, existentialist philosophers were responding to a European civilization that seemed to be in decay. How could people cope in a society where they were menaced by technology, manipulated by impersonal bureaucracies and overwhelmed by feelings of anxiety? These questions were at the base of existentialist philosophy. Among the most important exponents of existentialism we find: Musicians and painters, like writers and poets, experimented with new forms and styles. Although many of the new directions in painting and music began in the prewar period, they evolved

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after the war. Artists rebel against tradition. Artists rebelled against earlier realistic styles of painting. They wanted to depict the inner world of emotion and imagination rather than show realistic representation of objects. Some of the painters considered as Expressionist we find: Highly influential visual arts style of the 20th century that was created principally by the painters Pablo Picasso and Georges Braque in Paris between 1907 and 1912. The Cubist style emphasized the flat, two-dimensional surface of the picture plane, rejecting the traditional techniques like perspective and refuting old theories of art as the imitation of nature. Cubist painters were not bound to copying form, texture, colour, and space; instead, they presented a new reality in paintings that depicted radically fragmented objects, whose several sides were seen simultaneously. In both popular and classical music, composers moved away from traditional styles. A new popular style appeared in the United States. Developed mainly by African Americans, Jazz would have a profound impact on the U.S. While jazz may be difficult to define, improvisation is clearly one of its key elements. In Jazz, however, the performer will interpret a tune in very individual ways, never playing the same composition exactly the same way twice. Shorter workdays and slowly improving economies gave people more money and free time. After years of war, many people were ready to enjoy life. Developed in about 1895, motion pictures were first shown publicly about 10 years later. Baseball was popular in the U.S. Golf was widely played in both countries, as well as in some parts of Europe. Tennis was another popular sport. And in Latin America and Europe they mostly enjoyed soccer. As economies began to recover, more people began to purchase consumer goods. The price of many goods once considered luxury items, like automobiles, dropped significantly. As more people purchased such items, the whole structure of society began to change. Companies came up with new ways to get consumers to buy more goods. Companies also began offering to sell more goods on credit. The expanded use of credit reflected a gradual change in attitudes and values of the times. Increasingly people were focused on the present moment instead of planning for the future. For example, in industrialized nations many women started wearing short hair and skirts and going out to public places like Jazz clubs.

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Chapter 3 : The Aldrich Contemporary Art Museum - Article

This thematic selection of recent work from nine established and emerging international sculptors--the eldest born in and the youngest in collects the ways they are giving shape to the fleeting, ephemeral, theoretical and difficult-to-explain.

October 25, 10 a. On view from Oct. Despite their physicality, these sculptures lie somewhere between an object and an idea. Genuinely experimental, the artists in the exhibition respond intelligently to the history of sculpture while offering insights into how the medium can still challenge and expand our ways of understanding forms and ideas. Artists in the exhibition include: The Hirshhorn is recognized as having one of the pre-eminent collections of 20th-century sculpture in the country--from the figural works of Auguste Rodin and Henri Matisse to the abstract, geometric constructions of Alexander Calder and David Smith. The installation will begin in Winter With one leg bent and slightly imperfect, the piece brings a sense of absurdity and melancholy to recognizable signs and symbols of the urban environment. Enlivening the plaza and sitting on the bustling Independence Avenue side of the museum, the sculpture will offer a fresh dialogue between the Hirshhorn Museum and the Washington, D. The accompanying catalogue published by the Hirshhorn Museum features essays by art historian and critic Johanna Burton and Anne Ellegood. Programming for this exhibition includes a free lunchtime gallery talk by Evan Holloway at Andrea Cohen will lead a free lunchtime gallery talk on Friday, Nov. Support for the exhibition catalogue has been provided by Ray A. The Hirshhorn maintains an active and diverse exhibition program and offers an array of free public programs that explore the art of our time. Additional information on individual artists follows. Packing peanuts, pipe cleaners, origami paper and tree branches overlap, intersect, drape, stack and wrap. Together, the materials create a map of lines that are interconnected and reliant upon one another, reflecting the social networks of modern life. Inspired by Chinese and Japanese landscape paintings, Cohen uses natural and synthetic materials to create freestanding, human-scale, autonomous objects that comment upon the hybridity of nature and artifice. Linked to the ready made and large-scale modern works of such artists as Mark di Suvero and Anthony Caro whose works are on view in the sculpture garden , Handforth adds humor and narrative to abstraction, creating melancholic artifacts of the urban landscape. Distorting the ordinary, he encourages us to doubt the reliability of our perception, making us aware of how our subjective experiences and emotions impact our understanding of our surroundings. Deeply engaged with modes of display, her work examines the status of sight and its role in various belief systems--from religious beliefs to celebrity worship to the notion that material value will bring us happiness--continuously questioning how meaning is determined. Inspired by music and color theory, economics and mathematics, Holloway creates distinctive, often elegant and sometimes strange forms that are constantly in dialogue with the history of 20th century sculpture. The resulting works are eccentric and poetic constructions in muted tones. Largely through a process of automatic writing in the Surrealist tradition, Shapero has been crafting anachronistic, mythological narratives that are equal parts fairy tale and Gothic nightmare and inspire the formal language of her sculpture. Her sculptures are steeped in pattern and repetition and express a desire to capture the ethereal and fleeting in physical form--from weather patterns to psychological states of mind. Interested in human behavior and creating a social environment, West has likened his sculptures to making the invisible visible. His ungainly, imperfect and humorous works often reference the human body and encourage a critical position toward all things established and predictable.

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Chapter 5 : Postwar Uncertainty " art , music, science by maria paula jimenez merchan on Prezi

This thematic selection of recent work from nine established and emerging international sculptors--the eldest born in and the youngest in collects the ways they are giving shape to the fleeting, ephemeral, theoretical and difficult-to-explain. From Charles Long's delicate, poetic and.

Chapter 6 : The Uncertainty of Objects and Ideas: Recent Sculpture

"The Uncertainty of Objects and Ideas: Recent Sculpture" Andrea Cohen (born , American, lives in Brooklyn) creates sculptures that are like large, gestural drawings in space. Packing peanuts, pipe cleaners, origami paper and tree branches overlap, intersect, drape, stack and wrap.

Chapter 7 : The Uncertainty of Objects and Ideas: Recent Sculpture by Deborah Horowitz

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