BREAKING THE SCIENCE BARRIER pdf

1: Break the Science Barrier - Wikipedia

Break the Science Barrier is a television documentary written and presented by Richard Dawkins, which promotes the viewpoint that scientific endeavour is not only useful, but also intellectually stimulating and exciting.

A young researcher at the University of Utah, she was studying the relationship between reading and learning. In a reading study with adults, she had chosen what seemed to be an interesting but innocuous scientific passage on human evolution. She was dumbfounded when her participants reacted with raw emotion. In the fall she will be installed as the Stephen H. Crocker Professor of Education. The passage was on evolution, and many of her study participants, it turned out, believed their faith to be in conflict with the science. They clearly had understood the reading. But they categorically rejected it. A common response Sinatra heard in her assessment interviews: Sinatra is now a thought leader in the field of educational psychology, specializing in untangling the complex web of emotions and motivations that lead to successful learning â€" or to science resistance. Appropriately enough â€" given her expertise in the public understanding of science â€" Sinatra plans to focus her presidency on the theme of sustainability, both environmental and organizational. She and psychologist Barbara Hofer of Middlebury College are currently working on a comprehensive book for educators and communicators about the psychology of science resistance, doubt and denial. Sinatra has previously edited two books, written dozens of book chapters, co-authored more than 60 scholarly papers and delivered nearly conference presentations in educational psychology. She joined the USC Rossier faculty in and served as associate dean of research from to The learning platforms they study have come a long way since Sinatra hit a wall with that text about evolution 20 years ago. An intriguing project now underway at the La Brea Tar Pits, for example, investigates how different kinds of smartphone-based augmented reality experiences might lower emotional barriers to science learning in an informal public setting. Its mother approaches but cannot free her calf. The tendency crosses belief systems and party lines. The statistics are stark. A Pew Research Center study found that while 88 percent of scientists agree genetically modified organisms are safe to eat, only 37 percent of American adults hold that view. Despite a percent scientific consensus, only 65 percent of Americans believe humans evolved over time: Resistance triggers The roots of resistance to scientific evidence are complicated, according to Sinatra. With so many possible causes, there can be no one-size-fits-all fix. To make inroads with resistant learners, science educators need to be curious and nimble. Next, turn the negative emotions associated with those unwelcome facts into positive ones. And finally, familiarize everyone with the logic of the scientific method. Today, LDS does not take a position on biological evolution , and the LDS community includes many science teachers and active scientists. Educators can leverage that kind of change to promote learning. Sinatra recently collaborated with a colleague on workshops to help biology teachers in West Texas feel comfortable teaching evolution even if their religious beliefs did not support evolution. Another joint project through Arizona State University has self-identified Christian biologists discuss their faith with their students and explain how they are able to strike a balance between religion and science. Plenty of people still think the Earth is flat. It has more to do with psychology, which I find utterly fascinating.

BREAKING THE SCIENCE BARRIER pdf

2: What happens when an aircraft breaks the sound barrier? - Scientific American

Science is useful but that is not all it is. Science can be uplifting, thrilling, life-enhancing. Originally broadcast on Britain's Channel 4 in , Break the Science Barrier follows the Oxford Biologist Richard Dawkins as he meets with people who have experienced the wonders of science first-hand.

By David Shultz May. On Saturday, Kenyan runner Eliud Kipchoge came closer to breaking the 2-hour marathon barrier than any person in history, racing While they deliberate, find out what researchers are doing to engineer the perfect runner, as detailed in this story below, originally published online 3 March. The statistical calculus of sport contains barriers that once seemed to be iron but proved to be glass. Will the same hold true of the 2-hour marathon? Scientists and engineers in a group called Sub2 have been pushing toward the goal for years now, and in the past few months, major players like Nike and Adidas have announced projects aimed at bringing down the barrier. But running 42 kilometers in minutes remains elusive. So what will it take to push athletes over the hump? How much faster do we need to get? Shaving 3 minutes off those times amounts to roughly a 2. Although that might not seems astronomical to the casual runner, Ross Tucker, a sports scientist at the University of Cape Town in South Africa, points out that professional marathon runners are far from casual. How do we make the runner more powerful? That means runners will probably have to become more efficient instead of more powerful. How do we make the runner more efficient? Running is filled with inefficiency. But Bekele fell early in the race and did not finish. He thinks the marathon performance is far from optimized, noting that many elite East African runners do not make use of new technologies like fitness trackers or perfectly optimized training and diet schedules. How can we make the course easier? An all-downhill course in ideal weatherâ€”preferably a stiff tailwindâ€”might do it. Pacers could run part of the course at a subâ€”2-hour pace, allowing the racer to cut air resistance by running in their wake. The downside of such measures is that the International Association of Athletics Federations might not certify a record-setting run. In their pledge to break the 2-hour barrier sometime this year, Nike admitted that their time would not be record eligible. Tucker and the Sub2 group suspect that the company plans to manipulate the course and conditions in their favor. Nike did not respond to a request for comment. Is this a realistic goal for the near future? If all goes well and his team can secure enough funding, he thinks that it can break the 2-hour barrier by without relying on spring shoes or other gimmicks.

BREAKING THE SCIENCE BARRIER pdf

3: Sound barrier - Wikipedia

*Breaking the Science Barrier: How to Explore and Understand the Sciences [Sheila Tobias, Carl T. Tomizuka] on www.enganchecubano.com *FREE* shipping on qualifying offers. Explains why science is important to non-science majors, surveys science history, and discusses science vocabulary.*

It was a skydive that shattered records for the highest manned-balloon flight and the highest altitude jump. Baumgartner had become the first man to break the sound barrier with just his body -- without the safety of an airplane. A New Record Last week, Alan Eustace, an executive at Google, broke that record by rising up to the edge of the stratosphere - to a height of , feet or 41, m. Unlike Baumgartner who used a special capsule, Alan Eustace clung to a helium balloon that rose above the New Mexico desert. Once he reached the desired height, Eustace cut the cord. His free fall lasted about five minutes, during which time he reached a peak speed of miles per hour - faster than the speed of sound! Eustace deployed his parachute at 18, feet and floated back to the ground. For the stunt, Eustace wore a special suit with a life support system, as did Baumgartner for his maiden jump. The reason for this is because the human body cannot survive that altitude - the thin air would make it difficult to breathe, and the vacuum in space would cause fluids in the body to boil. Have you seen a wave in a football stadium? Similarly, the molecules in the atmosphere vibrate when sound waves hit them. This vibration is passed on to the next molecule and the next, creating what we call a sound wave. Is there a real, physical barrier to sound? No, the word refers to the buildup of air in front of an aircraft. When an aircraft reaches the speed of sound, air particles cannot get out of the way fast enough. This creates drag, or an opposing force which in turn creates shock waves that jolt an aircraft. Nowadays, aircrafts and spacecrafts routinely break the sound barrier. When the speed of sound of a moving body is the same as that of sound, it is said to be Mach 1. Alan Eustace reached a speed of Mach 1. Was There A Sonic Boom? You may have heard of sonic booms - or shock waves, produced when an object crosses the speed of sound. Eustace did not feel it when he broke the sound barrier. But the ground crew observing the event, certainly heard the resulting sonic boom. This is similar to if you were standing on a dock, and a speed boat went by faster than the speed of waves. It would generate a wake and you would feel it. However, given the size and the altitude, any shock waves would have dissipated quickly.

BREAKING THE SCIENCE BARRIER pdf

4: What will it take to break the 2-hour marathon? | Science | AAAS

SCIENCE is useful but that is not all it is. Science can be uplifting, thrilling, life-enhancing. Originally broadcast on Britain's Channel 4 in , Break the Science Barrier follows the Oxford.

History[edit] Some common whips such as the bullwhip or stockwhip are able to move faster than sound: Some paleobiologists report that, based on computer models of their biomechanical capabilities, certain long-tailed dinosaurs such as Apatosaurus and Diplodocus may have been able to flick their tails at supersonic speeds, creating a cracking sound. This finding is theoretical and disputed by others in the field. This is undesirable, as the transonic air movement creates disruptive shock waves and turbulence. It is due to these effects that propellers are known to suffer from dramatically decreased performance as they approach the speed of sound. It is easy to demonstrate that the power needed to improve performance is so great that the weight of the required engine grows faster than the power output of the propeller can compensate. This problem was one that led to early research into jet engines , notably by Frank Whittle in England and Hans von Ohain in Germany, who were led to their research specifically in order to avoid these problems in high-speed flight. Nevertheless, propeller aircraft were able to approach the critical Mach number in a dive. Unfortunately, doing so led to numerous crashes for a variety of reasons. Most infamously, in the Mitsubishi Zero , pilots flew at full power into the terrain because the rapidly increasing forces acting on the control surfaces of their aircraft overpowered them. This was solved in later models with changes to the wing. Worse still, a particularly dangerous interaction of the airflow between the wings and tail surfaces of diving Lockheed P Lightnings made "pulling out" of dives difficult; however, the problem was later solved by the addition of a "dive flap" that upset the airflow under these circumstances. Flutter due to the formation of shock waves on curved surfaces was another major problem, which led most famously to the breakup of de Havilland Swallow and death of its pilot, Geoffrey de Havilland, Jr. A similar problem is thought to have been the cause of the crash of the BI-1 rocket aircraft in the Soviet Union. All of these effects, although unrelated in most ways, led to the concept of a "barrier" making it difficult for an aircraft to exceed the speed of sound. The majority of these purported events can be dismissed as instrumentation errors. The typical airspeed indicator ASI uses air pressure differences between two or more points on the aircraft, typically near the nose and at the side of the fuselage, to produce a speed figure. At high speed, the various compression effects that lead to the sound barrier also cause the ASI to go non-linear and produce inaccurately high or low readings, depending on the specifics of the installation. This effect became known as "Mach jump". Many claims of supersonic speeds were found to be far below this speed when measured in this fashion. In , Republic Aviation issued a press release stating that Lts. Comstock and Roger Dyar had exceeded the speed of sound during test dives in the P Thunderbolt. It is widely agreed that this was due to inaccurate ASI readings. In similar tests, the North American P Mustang , a higher performance aircraft, demonstrated limits at Mach 0. Mutke reported not just transonic buffeting but the resumption of normal control once a certain speed was exceeded, then a resumption of severe buffeting once the Me slowed again. He also reported engine flame out. Further, a series of tests made by Karl Doetsch at the behest of Willy Messerschmitt found that the plane became uncontrollable above Mach 0. Post-war tests by the RAF confirmed these results, with the slight modification that the maximum speed using new instruments was found to be Mach 0. These tests do not rule out the possibility, but are lacking accurate data on the coefficient of drag that would be needed to make accurate simulations. No vertical dives were made. The results vary with different airplanes: It is also reported that once the speed of sound is exceeded, this condition disappears and normal control is restored. The comments about restoration of flight control and cessation of buffeting above Mach 1 are very significant in a document. However, it is not clear where these terms came from, as it does not appear the US pilots carried out such tests. He reached this speed at less than full throttle, as he was concerned by the transonic buffeting. Dittmar himself does not make a claim that he broke the sound barrier on that flight, and notes that the speed was recorded only on the AIS. He does, however, take credit for being the first pilot to "knock on the sound barrier. This occurred while he was piloting a Bachem Ba "Natter" for the first manned vertical takeoff of a rocket in history. The aircraft

crashed and he perished violently in this endeavor. In , Soviet designers working on ramjet concepts fired phosphorus-powered engines out of artillery guns to get them to operational speeds. It is possible that this produced supersonic performance as high as Mach 2, [22] but this was not due solely to the engine itself. In contrast, the German V-2 ballistic missile routinely broke the sound barrier in flight, for the first time on 3 October Breaking the sound barrier[edit] The prototype Miles M. The project resulted in the development of the prototype Miles M. A huge number of advanced features were incorporated into the resulting M. In particular, the design featured a conical nose and sharp wing leading edges, as it was known that round-nosed projectiles could not be stabilised at supersonic speeds. The design used very thin wings of biconvex section proposed by Jakob Ackeret for low drag. The wing tips were "clipped" to keep them clear of the conical shock wave generated by the nose of the aircraft. The fuselage had the minimum cross-section allowable around the centrifugal engine with fuel tanks in a saddle over the top. Conventional control surfaces became ineffective at the high subsonic speeds then being achieved by fighters in dives, due to the aerodynamic forces caused by the formation of shockwaves at the hinge and the rearward movement of the centre of pressure , which together could override the control forces that could be applied mechanically by the pilot, hindering recovery from the dive. An all-flying tail is considered to be a minimum condition of enabling aircraft to break the transonic barrier safely, without losing pilot control. To develop a fully supersonic version of the aircraft, an innovation incorporated was a reheat jetpipe â€" also known as an afterburner. Extra fuel was to be burned in the tailpipe to avoid overheating the turbine blades, making use of unused oxygen in the exhaust. Although the project was eventually cancelled, the research was used to construct an unmanned missile that went on to achieve a speed of Mach 1. Meanwhile, test pilots achieved high velocities in the tailless , swept-wing de Havilland DH One of them was Geoffrey de Havilland, Jr. Sound barrier officially broken in aircraft[edit] The British Air Ministry signed an agreement with the United States to exchange all its high-speed research, data and designs and Bell Aircraft company was given access to the drawings and research on the M. They utilized the information to initiate work on the Bell X The final version of the Bell X-1 was very similar in design to the original Miles M. Also featuring the all-moving tail, the XS-1 was later known as the X George Welch made a plausible but officially unverified claim to have broken the sound barrier on 1 October , while flying an XP Sabre. He also claimed to have repeated his supersonic flight on October 14, , 30 minutes before Yeager broke the sound barrier in the Bell X Although evidence from witnesses and instruments strongly imply that Welch achieved supersonic speed, the flights were not properly monitored and are not officially recognized. The XP officially achieved supersonic speed on April 26, The rocket-powered aircraft was launched from the bomb bay of a specially modified B and glided to a landing on a runway. XS-1 flight number 50 is the first one where the X-1 recorded supersonic flight, at Mach 1. Jackie Cochran was the first woman to break the sound barrier on May 18, , in a Canadair Sabre , with Yeager as her wingman. Edwards flight test engineer. As the science of high-speed flight became more widely understood, a number of changes led to the eventual understanding that the "sound barrier" is easily penetrated, with the right conditions. Among these changes were the introduction of thin swept wings , the area rule , and engines of ever-increasing performance. By the s, many combat aircraft could routinely break the sound barrier in level flight, although they often suffered from control problems when doing so, such as Mach tuck. Modern aircraft can transit the "barrier" without control problems. However, this has not yet happened. Although the Concorde and the Tupolev Tu entered service in the s, both were later retired without being replaced by similar designs. The last flight of a Concorde in service was in Although Concorde and the Tu were the first aircraft to carry commercial passengers at supersonic speeds, they were not the first or only commercial airliners to break the sound barrier. The purpose of the flight was to collect data on a new design of leading-edge for the wing. Breaking the sound barrier as a human projectile[edit] Felix Baumgartner[edit] In October Felix Baumgartner , with a team of scientists and sponsor Red Bull, attempted the highest sky-dive on record. The launch was scheduled for October 9, , but was aborted due to adverse weather; subsequently the capsule was launched instead on October In the press conference after his jump, it was announced he was in freefall for 4 minutes, 18 seconds, the second longest freefall after the jump of Joseph Kittinger for 4 minutes, 36 seconds.

BREAKING THE SCIENCE BARRIER pdf

5: Breaking down the emotional barriers to science learning - USC Rossier School of Education | USC

Being able to deliver drugs into the brain to treat degenerative diseases such as Alzheimer's or Parkinson's requires the ability to traverse the blood-brain barrier (BBB).

Print Advertisement Tobias Rossmann, a research engineer with Advanced Projects Research and a visiting researcher at the California Institute of Technology, provides the following explanation. Any discussion of what happens when an object breaks the sound barrier must begin with the physical description of sound as a wave with a finite propagation speed. Anyone who has heard an echo sound waves reflecting off a distant surface or been far enough away from an event to see it first and then hear it is familiar with the relatively slow propagation of sound waves. At sea level and standard atmospheric conditions of 22 degrees Celsius, sound waves travel at meters per second miles per hour. As the local temperature decreases, the sound speed also decreases, so for a plane flying at 35, feetwhere the ambient temperature is 54 Cthe local speed of sound is meters per second miles per hour. Because the propagation speed of sound waves is finite, sources of sound that are moving can begin to catch up with the sound waves they emit. As the speed of the object increases to the sonic velocity the local velocity of sound waves , these sound waves begin to pile up in front of the object. If the object has sufficient acceleration, it can burst through this barrier of sound waves and move ahead of the radiated sound. The change in pressure as the object outruns all the pressure and sound waves in front of it is heard on the ground as an explosion, or sonic boom. At supersonic speeds those greater than the local sound speed , there is no sound heard as an object approaches an observer because the object is traveling faster than the sound it produces. Only after the object has passed will the observer be able to hear the sound waves emitted from the object. These time periods are often referred to as the zone of silence and the zone of action. When the object has passed over the observer, the pressure disturbance waves Mach waves radiate toward the ground, causing a sonic boom. The region in which someone can hear the boom is called the boom carpet. The intensity of the boom is greatest directly below the flight path and decreases on either side of it. Navy Ensign John Gay captured one of the best images ever taken of a sonic boom the breaking of the sound barrier in Because aircraft wings generate both low-pressure regions because of lift and amplified low-pressure disturbances, large low-pressure regions exist near the aircraft, especially under sonic flight conditions. The lowered pressure condenses the water in the air, creating a vapor cloud. As the jet produces these pressure waves and propagates ahead of them, the regions of lower pressure are usually strongest behind the nose of the jet, on the wings and body. As the aircraft continues to speed up, the vapor cloud will appear farther toward the rear of the aircraft. Ensign Gay snapped his photo at the moment he heard the boom, just before the cloud vanished. Thus, it literally appears as if the F is pushing through the sound barrier at the instant the photo was taken.

BREAKING THE SCIENCE BARRIER pdf

6: What Does Breaking the Sound Barrier Mean?

Science projects within the local schools may reach new heights thanks to student Kameron Young. The high school student, along with her mentor Dr. Carika Weldon, will host a special "behind the.

Check new design of our homepage! When an object moves faster than the speed of sound, the object is said to have broken the sound barrier. In this article, we will take a look at this phenomenon, and study its causes and effects closely. ScienceStruck Staff Last Updated: Dec 10, Did You Know? The vapor cones that one sees around an aircraft approaching transonic velocity occur due to shock waves of supersonic flow speed, which causes reduction in air pressure and the condensation of atmospheric water. What is a Sound Barrier? The sound barrier can be defined as a hypothetical barrier to flight beyond the speed of sound, so postulated because the aircraft undergoes an abruptly increasing drag force induced by compression of the surrounding air when traveling near the speed of sound. The speed of sound decreases or increases in direct proportion to the surrounding temperature and the density of the medium. Accordingly, the speed of breaking the sound barrier changes with the surrounding atmospheric conditions. An easy example to see the sound barrier being broken is the crack that a bullwhip makes, where the tip of the whip moves faster than the speed of sound, causing the cracking sound a small sonic boom. It is important to note that, while people automatically assume the speed of sound to be the speed of sound in the air, it actually always differs depending on the density and type of medium it is passing through. For example, the speed of sound in water is almost four times that of its speed in the air, i. To understand what happens when an object breaks the sound barrier, one must consider sound as a wave with limited speed. We also have to look at how the airflow around the airplane changes with the increase in its speed. At Less Than the Speed of Sound: Airplanes which fly slower than the speed of sound create air pressure disturbances which move at the speed of sound, at a distance from the plane. The airflow has enough time to spread out and disperse the pressure disturbance. In these conditions, the sound of the airplane will reach an observer before the plane does. At the Speed of Sound: When the plane reaches the speed equaling that of sound, the pressure disturbances gather together in front of the aircraft. The plane gets very close to the waves of pressure it is creating due to its high-powered forward thrust. This causes a sudden and significant increase in drag, as the airflow has very little time to adjust, and gets compressed into a wall or barrier. Greater Than the Speed of Sound: As the airplane now moves faster than sound, and moves into supersonic speed, the air has absolutely no chance to adjust, causing massive shock waves, which can be associated with the sonic boom, as the sound emitted from the plane reaches the observer much later than the airplane. A sonic boom will only be heard once the airplane passes the observer, as air rushes in to fill the low-pressure space created behind the plane. When a jet breaks the sound barrier, most sonic booms can be heard as a short but loud clap of thunder. The intensity of a sonic boom does not change with higher or lower acceleration, rather, it is affected by the size of the airplane, i. Human Accomplishments and Records In the early s, researchers turned their attention towards the challenges that pilots faced while trying to reach supersonic speeds. Although other objects, such as bullets, canon balls, and meteors were known to go faster than sound, it was highly doubtful whether an airplane or a person could stand the pressures of moving with such velocity. The US Air Force decided to put the theories to the test. Finally, on the 14th of October , with almost a decade of research, U. Air Force Captain Chuck Yeager became the first man to successfully break the sound barrier in human history, in the cockpit of an experimental rocket-powered plane, named the Bell-X1. This event paved the way for human spaceflight and extraterrestrial exploration. By the end of the s, jet planes were routinely breaking this speed record. On October 14, , exactly 65 years after this feat was accomplished, another man, named Felix Baumgartner, broke the sound barrier. After jumping, Felix remained in freefall for around 34 seconds, when he broke the sound barrier and reached speeds of around mph mach 1. This high speed was possible due to the low pressure and air resistance in the stratosphere. Despite being a common ability for most airplanes nowadays, breaking the sound barrier is not cheap, as pushing through the wall of air adversely affects fuel economy. This is why commercial airliners abstain from going supersonic. This success of breaking the sound barrier has inspired people from around the world, and

proved that with will and courage, any barrier can eventually be broken.

7: Break the Science Barrier | Revolvy

The word 'sound barrier' was first coined by early 20th century aviators, as they struggled to make their aircrafts go faster. Nowadays, aircrafts and spacecrafts routinely break the sound barrier. When the speed of sound of a moving body is the same as that of sound, it is said to be Mach 1.

8: Student's Science Project 'Breaking Barrier' - Bernews

It wasn't a physical manifestation from breaking the sound barrier after all. It all depends on the presence humidity, as NASA explains, which allows the water vapor to condense into a cloud.

9: Break the Science Barrier | Science Documentaries

Off the coast of Pusan, South Korea, July 7, -- An F/A Hornet assigned to Strike Fighter Squadron One Five One (VFA) breaks the sound barrier in the skies over the Pacific Ocean.

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Impacts on the sector Jose Falck-Zepeda, Melinda Smale and Daniela Horna Non-invasive diagnosis and assessment A J Di Mambro, A Terlevich, C Probert Transform method in linear system analysis. A woman of no nerves. Atlas of confocal laser scanning in-vivo microscopy in opthalmology [i.e. ophthalmology] Best site tehparadox The romantic ballet in England Ing from paid website The fall and redemption of man and the will of God Becoming More Authentic Discontent and resistance. When dreams and expectations dont match up Fall Asleep Without Counting Sheep First book of bridge Practical competitive binding assay methods What Price for Blood? Econoguide 2002 Las Vegas A Royal Proposition The red tent novel On the use of the name taconic Facs manual 527-page In command of France Life sketches from common paths The unwritten law in the pre-rabbinic period. Germany: A New Social and Economic History Exercitii de echilibru tudor chirila Who Says This Is Cheating? A short history of the American stomach National Armories Expenses, etc. Letter from the Secretary of War, ad interim, transmitting a statement o Principles of corporate finance 10th edition test bank Life skills training dvd curriculum for adults Exact bounds on transport coefficients Capt. Edward OShea. Microsoft Visual J 6.0 deluxe learning edition Amharic-English/English-Amharic Dictionary (Peacock series) Food and beverage department Geology of Sirt Basin Definition of strategic human resource management A Grammar of Modern Cornish The parable of the arrest