

Free Radical

The Sound of Fear

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One of the most terrifying experiences I have ever had was on a flight from Chicago to São Paulo several years ago. I was taking an overnight flight, heading to a new media festival, and there was a long delay before take off from O'Hare Airport, so it was not long after we were in flight that I became very sleepy. I was awakened a few hours later to the cabin lights flickering and an announcement from the cockpit. The plane was losing electrical power and would have to make an emergency landing in Florida. Despite my groggy daze and reassurances from the pilot, I experienced an intense fear for several hours. We finally landed at 2 AM in Miami and completed the journey on another plane.

Years later, I find that a vivid memory of this experience is triggered in my mind by certain sounds. During the ordeal, I focused on the sounds on the plane, a loud drone coming from the engines combined with a noise that sounded like a wind tunnel. When I am exposed to a similar combination of sounds now, I experience shortness of breath, as if I am suffocating, despite the absence of any danger.

Sound is pressure, similar to the motion of pushing against water in order to cause waves in a pool. Pressures that are very high (i.e. very loud sounds) can cause physical damage to the ear. The speed of the waves also affects the body. Humans can hear sounds between 20 Hz (cycles per second) to 20,000 Hz, but the human body can be affected by sounds it cannot hear in both the ultrasound (above 20,000 Hz) and infrasound (under 20 Hz) range.

High frequency ultrasound is the kind of sound used widely in medical and underwater imaging. Infrasound can be detected over long distances and is used by scientists to help predict natural disasters like earthquakes, volcanic eruptions, tornadoes and avalanches. The U.N. nuclear test ban agency oversees the most sensitive infrasound detection network in the world to identify nuclear weapons tests. The detectors used by the agency have been found sensitive enough to hear the rumbling of exploding meteors almost 5000 miles away. [1]

At high pressures, ultrasound damages the body; low frequency infrasound also has a negative effect on the body, and both frequencies have been explored by governments for the purpose of creating lethal and non-lethal weapons. Humans aren't the only species that might use infrasound to shock and awe enemies. Recent research suggests that tigers may deliver a

physically stunning 18Hz roar immediately before attacking.

Low frequencies between 7 and 8 Hz are thought to be the most dangerous to humans, causing vibrations of the chest wall, changes in respiratory rhythm, gagging sensations, headaches, coughing, and post-exposure fatigue. Infrasound in this range can also cause vibration of the eyeballs, and therefore a distortion of vision or even temporary blindness.

Infrasound produced by machine noise in the environment or by natural phenomena (approaching storms for example) has been used to explain accounts of ghost sightings. The infrasound causes a feeling of dread combined with eye vibrations creating blurred hallucinatory visions. The mistral winds in the Rhone Valley and the Sirocco winds off the Sahara are legendary winds that are said to produce temporary insanity. Both winds have also been found to emit infrasound frequencies. The disturbing 2002 French film *Irreversible* uses extremely low-frequency sound during its opening to create a state of disorientation and unease in the audience.

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In addition to its physical effects, sound has a contextual meaning. Although some sounds are easily identified (like a barking dog or a cat's meow, for example), sounds can have a level of ambiguity. In the industrial area where I live, the air is often pierced by various machine sounds, and it is often unclear what kind of machine or process is creating the sound. If an echo interacts with the sound, the process of recognizing the sound becomes similar to that of trying to see an object while wearing glasses that are heavily fogged.

Unlike a still visual image, sound is inherently narrative. For example, as I listen to footsteps and voices outside my apartment door, I might be able to determine that two people are walking up the stairs of my

building. I can identify approximately what floor they are on and might even learn a little about their relationship: are they a couple? A mother and child? Are they arguing or laughing? By contrast, if I view a photograph of a family, I am more likely to have difficulties in determining the character of the relationships between the subjects, unless their emotional states are depicted in a very obvious way.

Can this kind of emotional, narrative content of sound enhance the understanding of abstract information? Some meteorologists call themselves "storm hunters." They travel far and wide at considerable physical risk in order to experience a hurricane or tornado. Storm hunters say that the emotional exhilaration inherent in the process enhances their scientific understanding of the storm: they experience the sound, scale, and physical properties of the storm as well as its effect on the surroundings. A storm perceived only through a visualization, whether animated or static, obviously does not convey any of this visceral information. Scientists must use their imagination to create a mental image of the storm's devastation.

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In 2004, Mark Bain, who identifies himself as a "vibration artist" and creates sound installations by attaching oscillators to buildings and other architectural structures, created an audio CD using seismological data recorded by Columbia University in New York on the morning of September 11th, 2001. 74-minutes long, the work "time-stretches" the ground vibrations caused by the World Trade Center towers at the moments of impact with the seismological data of the two commercial airliners and the buildings' subsequent collapse. Writer Mark Oliver of the Guardian referred to the effect of this work as "The Day the Earth Screamed." [2]

The seismological data stream used by Bain was not, of course, specifically recorded for the purpose of documenting the attack. Columbia University was just doing what it does every hour of every day, listening for possible earthquakes and recording data for review and analysis. This massive data collection project made no distinction between an ordinary day and September 11th, a day that started out ordinary but turned out to be one of the most significant days in recent history. To the computers recording the data, there was no particular aspect of that tiny piece of the larger seismological database that made it any more or less significant than any other part of the database.

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However, when Bain selected and created a system to interpret the information, the data was transformed into something deeply meaningful and emotional.

Non-lethal weapons researchers have also explored the use of "contextual sound" as a way of influencing and controlling emotions on an international scale. An article by David Hambling in the Guardian in 2000 discussed how this phenomenon might be exploited as a military tactic:

We are in Baghdad, and something strange is happening. A hush falls over the city as a huge shimmering face materialises in the sky. Soldiers and citizens prostrate themselves as each hears the voice of Allah, commanding them to overthrow the evil and treacherous Saddam Hussein. Within minutes an angry mob is storming the palace as the guards flee ...

Hambling states that the creation of this illusion was proposed by the US Air Force (USAF) during the first Gulf War. Called "Project Blue Beam," the concept is a contemporary version of what is known as "The Flying Dutchman Illusion" -- the illusion of a ghost ship floating in the sky, which is produced when the reflective properties of water in the atmosphere create a giant mirror. An artificial mirage could therefore be created by heating water in the atmosphere with radio waves or microwaves and then projecting a holographic image onto the resulting mirror.

Microwaves would also be employed to produce the sound accompanying this artificial Allah. A high-power microwave pulse striking a human body could create an acoustic wave. According to Hambling, the USAF scientific advisory board stated: "With a pulse stream, an internal acoustic field of 5-15KHz can be created which is audible. Thus it may be possible to 'talk' to adversaries in a way which would be most disturbing to them." [3]

While the scientific knowledge necessary to pull off such a stunt may be impressive, the scenario reveals a shocking lack of social and cultural knowledge. Not only are images of Allah forbidden in Islam -- making it impossible to project an image of God that would be recognizable to anyone -- but the population of Baghdad largely consists of sophisticated urbanites who have been exposed to computer-generated special effects for many years rather than people from an isolated society who are likely to panic at the sound of a disembodied voice.

Thinking back to my own experiences during the above-mentioned flight and those of the storm hunters, it seems obvious that sound serves as an important aid to memory. There is a global movement promoting the historical preservation of sound that has gained increasing momentum over the past 30 years. One

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very poignant recent project related to sound and memory is the Sonic Memorial Project initiated by National Public Radio's *Lost & Found Sound* producers The Kitchen Sisters -- Davia Nelson and Nikki Silva. The Sonic Memorial is an open archive and an online audio installation of the history of The World Trade Center, containing stories, ambient sounds, voicemails, and archival recordings to tell the rich history of the twin towers, the neighborhood and the events of 9/11. More than 50 independent radio and new media producers, artists, historians, and people from around the world have submitted personal and archival recordings, which amount to a total of more than 1,000 contributions. [4]

The strong connection between sound and memory points to another way in which projects such as Mark Bain's translation of seismological data to sound or works that transpose infrasound and ultrasound into listenable frequencies may function. Could the emotional quality of sound aid the memories of researchers who are listening to complex information over long periods of time? Might data translated into sound be a stronger memory trigger for recognizing a familiar pattern than a visual image showing the same pattern? Or, could sound assist researchers in remembering details related to previous data by putting them back into the emotional and mental state they found themselves in when they previously heard the pattern?

For several years after the death of my grandfather, I had been able to trigger a vivid memory of his voice in my mind. Even now as I write about it, I can almost hear his very specific Eastern European accent mixed with Mid-western cadence and intonation. Could this kind of character of sound be used in an educational or scientific context? Gavin Starks, a musician who has also worked as an astronomer, has used sound to communicate the detailed chemical composition of distant stars. [5] Each star has a very specific and detailed "voice" that, I imagine, could be as rich as the voice of my grandfather.

R. Murray Schafer, one of the founders of the World Soundscape Project, suggests that silence might be far more frightening than any sound: "Man fears the absence of sound as he fears the absence of life. As the ultimate silence is death, it achieves its highest dignity in the memorial service." [6]

In sound, there is an affirmation of life and a connection to the environment.

The morning after my fearful flight to São Paulo, I wrote some notes to help calm myself down, which I would like use as my closing paragraphs:

During the flight, I experienced a desire to release myself from the boundaries of the shell of my body and become part of the surrounding environment.

This desire was unrelated to the type of environment (natural, man-made), but instead was related to my state of mind. Is this desire related to the desire that brings one to write, to create art, to study the very large and the very small? (I.e. looking through a microscope as a form of transportation of the body similar to that experienced when looking at a religious icon or a mandala).

My words replay texts read and heard in the past, a memory that has been constructed throughout history. Is accessing this history a way of transcending the limits of the body? A way of becoming part of the thoughts and consciousness of the past? Are these ideas always with us -- "part of the aether" that surrounds us -- or are they waves of energy that encompass our bodies and need to be decoded like receivers decode radio waves?

Geologically, the languorous pace of the Earth is one that is difficult for the human body to understand. However, the human experience of the Earth is one of constant change. Storms suddenly create drastic fluctuation in the visual, aural, and tactile experience of the Earth. There is a constant to these fluctuations, as humans experience the cycle of change, a constant re-assurance of the stability of the Earth. As you look at long spans of time -- again the experience is like looking over large distances -- one feels that it is possible to transcend the limitations of a human life span.

At times, when in the throes of an idea, I feel that a transformation is possible. A feeling that is at once exhilarating and frightening. To be on the threshold of the limits of the body -- dead yet alive. Is it that part of the collective memory is the memory of death? And that this memory bubbles to the surface of the conscious mind in the ecstatic moment? Death itself is the only infinite experience of the body.

References:

- [1] David Perlman, "The Rumble of Destruction," *The San Francisco Chronicle*, February 24, 2003
- [2] Mark Oliver, "The Day the Earth Screamed," *The Guardian*, London, February 13, 2004
- [3] David Hambling, "Bring Down the Wrath of God on Evil Men," *The Guardian*, London, February 3, 2000
- [4] The Sonic Memorial Project, <http://www.sonicmemorial.org/>
- [5] Gavin Starks' project page, <http://www.dgen.net/music/>
- [6] R. Murray Schafer, *The Tuning of the World* (University of Pennsylvania Press: Philadelphia, PA, 1980), p. 256