The study of acoustics all started with Galileo (*Gal-lee-lei*) Galilei between the years of 1580 and 1642 which studied vibrations between the pitch and frequency of the sound. (*Berg, R. E. (2019, August 20*).

To understand what frequencies are, you need to understand music, sound, and acoustics.

The differences in pitches, tones, tempos, and range.

An average hearing range is 20 to 20,000 Hertz which does vary from person to person depending on age, ear damage, accidents, hearing aids, or simply the range that a person can hear. This is determined through different types of hearing tests and bone conduction testing.

The range is how we interpret the sound that affects our hearts, mind, and emotions. When listening to music or singing it causes effects and reactions to the body and causes a response. It stimulates a response which is part of the stimuli.

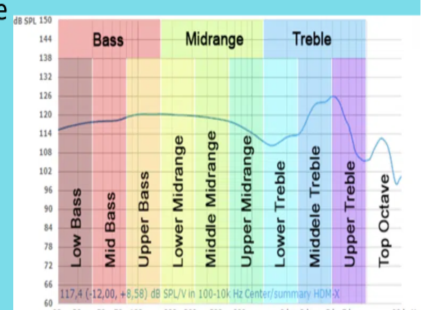
Frequency- measured in Hz is a specific pitch or tone and measurement of audio output, interval of time

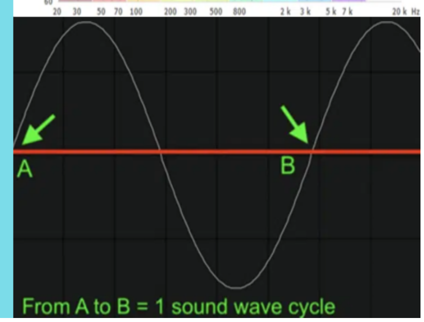
- Lower Frequency-lower pitch of sound — Example: bass guitar
- Higher Frequency-Higher pitch of sound — Example: Cymbals

Frequency Range- Audio frequency heard by humans (animals) 20 Hz to 20,000 Hz.

- Sub-bass Range 40 Hz — Example: Sub woofer, Kick drum, Bass guitar, Electronic/Synthesizer
- Bass Range 100 Hz — Thickness & Weight — Example: Bass guitar, Cello
- Mid-Range 1200-3000 Hz — Clarity — Example: Trumpet, Saxophone
- High-End Range 5000-10000Hz — Airness & Energy — Example: Cymbals, Piccolo

Fundamental Frequency
Harmonic Frequency
Resonant Frequency
Natural Resonance Frequency
Angular Frequency: $y(t) = \sin\theta(t) = \sin(wt) = \sin 2\pi ft$ $d\theta/dt = w = 2\pi f$
Spatial Frequency: $y(t) = \sin\theta(t,x) = \sin(wt + kx)$ $d\theta/dx = k = 2\pi\epsilon$
Rotational Frequency: *N*, with respect to time: $v = dN/dt$
Utility Frequency: US-60 Hz UK-50 Hz
Aperiodic Frequency rate, $f = N/\Delta t$
Sonic Frequency





Fundamental Frequency: is the lowest or base of the instrument, sound or vibrating object (notes-music).

Harmonic Frequencies: accompany Fundamental frequencies and is multiple frequencies in combination.

Resonant Frequencies: are the vibrations of the sound or object of which the frequencies produce.

CUI devices (*Character-Based User Interface*)**:** relays, sensors, motion, interconnect, audio, switch, thermal. Which is now **GUI** (*Graphical User Interface*). And all incorporated with resonant frequencies.

The natural resonance is the oscillation of the vibrations of the resonant frequencies. For example, the elongated tones, notes, tone of the instrument.

Rotational Frequency: is the rate of change applied to rotational movement

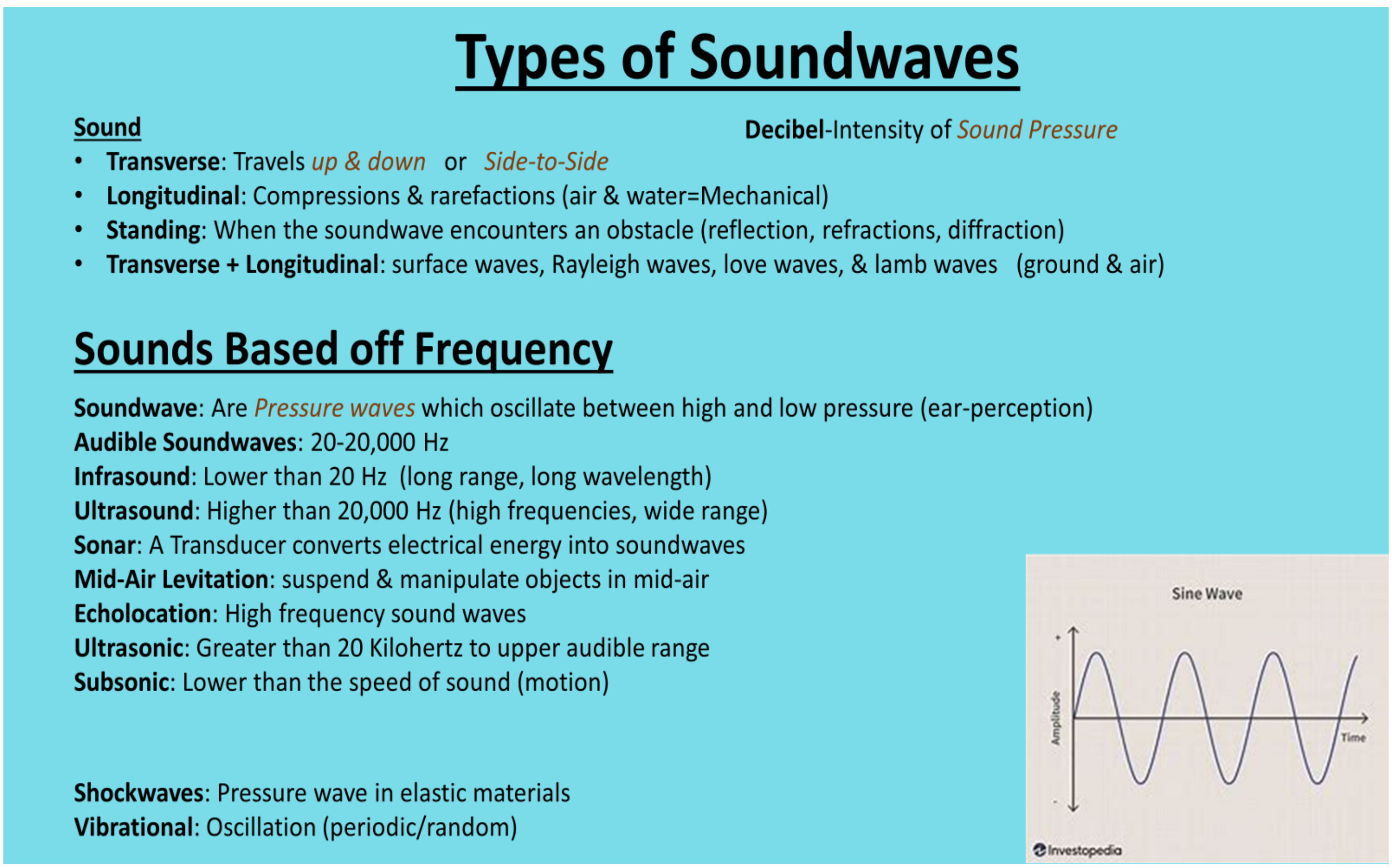
Angular Frequency: is your displacement (theta waves), phase changes, oscillations, sinusoidal waveform, sine function, dimensions, sampling interval, discrete-time signals.

Spatial Frequency: is temporal frequency, spatial period, or wavelength.

Line current is the utility which determines the alternating current within the electrical outlets between the tone (*Bb-B, A#, C, D-notes*). This causes the hum in audio recordings.

Aperiodic frequency: is the rate of incident or occurrence, non-cyclic, random processing, radioactive decay.

Sonic Frequencies: refers to the soundwaves with frequencies which are either inaudible or audible to humans.



Soundwaves can go through air, water, and solids, only if there are particles to transmit the vibrations. Mainly used in acoustics, communication systems, and medical imaging. Travel through wood, metal, stone, glass, and water.

Mechanical waves are a form of air or water waves which is also the form of compressions and rarefactions (longitudinal). This squeezes air molecules together

Standing Waves: produce either constructive or deconstructive interference. If we look at musical instruments constructive stand point, it would be a trumpet blowing its horn, but when you add a muffler, it dampens the sound and becomes destructive with the tone. Defraction is the bending or spreading out the sounds waves as they pass through an obstacle or through an opening.

Surface Waves travel along the surface of solid or liquids and the motion is Transverse.

Rayleigh waves are rolling motions which is observed during earthquakes.

Love Wave move like a snake moving side to side and is what makes the ground shake from the earthquake.

Lamb waves are guided waves that moves through solids plates or rods.

Infrasound: travels a long range without losing much energy.

Ultrasound: is used in medicine, scientific research, scans, measuring distance, detecting flaws in materials. It is the high frequencies waves that is sent into the body and echoes create images of internal structures.

Mid-air levitation: can be done without physical contact, (*material science, pharmaceuticals, levitating small living organisms*).

Echolocation: can determine size, objects, distance and shapes

Shockwave: is a pressure wave that is used in elastic materials such as air, water, or solid substances which can be produced by supersonic aircraft, explosions, lightning, or violent changes in pressure. Compression of elastic materials caused by stress, density, and temperature. Travel faster than sound because the energy that is produced is caused by heat of which it travels. Shockwaves alter mechanical, electrical, and thermal properties.

Ultrasonic (*Sonar*) transducers convert other energy into ultrasonic vibrations.

Procedures involving ultrasound have expanded into many areas of medicine, including Anesthesia. A good understanding of ultrasound and its benefits and limitations is therefore essential to anaesthetic practice. This article quickly outlines the fundamentals of ultrasound and how it is generated. Images obtained through ultrasound are often subject to artefact; the common artefacts encountered in clinical practice and difficulties imaging certain tissues are explained. Various imaging modes including Doppler ultrasound and their uses are also described. Although largely a safe and widely used technique, the potential safety concerns and hazards resulting from the effects of ultrasound waves on body tissues are discussed.

What is ultrasound?

Ultrasound is sound with a frequency above 20,000 Hertz (Hz) and is undetectable by the human ear. However, clinical ultrasound uses much high frequencies of between 1 and 20 megahertz (MHz) and sometimes up to 75 MHz in specialized areas such as dermatology and ophthalmology.

Clinically, ultrasound is used for a number of applications ranging from visualizing structures to allow safe insertion of lines and catheters to diagnostic imaging including the assessment of the movement of cardiac

Generation of ultrasound and the piezoelectric effect

Production of ultrasound waves is the first part of the clinical ultrasound process.

Ultrasound is generated by piezoelectric crystals. These crystalline materials contain randomly oriented electric dipoles, and when a force is applied that deforms the crystal, the dipoles are rearranged and a net charge induced across the crystal. Conversely, when a voltage is applied across the crystal this changes the physical arrangement of the dipoles causing bulk deformation of the crystal.

Sound waves

To better understand the uses of clinical ultrasound it is important to briefly revisit some basic properties of waves. Sound waves are longitudinal waves; that is, they have oscillations in the direction of travel as opposed to transverse waves that oscillate perpendicular to the direction of travel, **e.g. electromagnetic waves.**

The amplitude of the wave is the maximum disturbance produced by the wave, so for sound waves, which are mechanical waves, this would be the maximum.

Acoustic impedance and reflection

Acoustic impedance is the term used to describe the resistance to passage of ultrasound energy through a substance or tissue. Acoustic impedance (Z) is dependent on tissue density (ρ) in kg/m3 and speed of the sound wave in that tissue (c) in m/s.

Reflection or scattering of the ultrasound occurs when the wave encounters a change in acoustic impedance. The larger the impedance differences at the junction of two substances then the greater the energy disruption.

Passage of ultrasound through the body

As the ultrasound waves travel through the body, a number of things can happen. The waves can be reflected back to the probe, reflected in other directions, scattered or attenuated. Sound waves follow similar principles to light waves and behave in a similar manner when they meet an object or pass through tissues and air.

Doppler ultrasound

So far, we have looked at measuring distance with ultrasound. Estimation of the speed of ultrasound waves in tissues (~1540 m s−1) allows the distance travelled by a reflected ultrasound to be calculated from the time taken for the returning echo to reach the probe. The other pieces of important information that can be provided by ultrasound are velocity and direction, and for that the Doppler effect is required. Velocity and direction are calculated from the Doppler shifts of the returning sound.

Phased array ultrasound

Clinical ultrasound is almost entirely performed using a phased array transducer probe. Multiple small transducers capable of emitting and receiving ultrasound are arranged in an array, i.e. a line. When all transducers are activated simultaneously by an electrical current, a wave is generated parallel to the probe surface. The individual wave fronts combine to form a single wave front that travels through the tissue in a process called *'constructive interference'.*

A mode (amplitude) is the simplest mode of ultrasound generated by a single transducer. A line is scanned through the area of interest and the echoes plotted against depth in one direction, as a stand-alone imaging mode, it is almost obsolete but it is sometimes combined with M mode imaging and is used in therapeutic ultrasound.

B mode (brightness) is the most common form of clinical ultrasound. Ultrasound produced from a linear array scans an area of the body within a small plane about 1–2 mm

Acoustic shadowing

At interfaces with a large acoustic impedance mismatch the near-total reflectance of ultrasound means that there are no ultrasound waves able to travel further and penetrate deeper tissues. This means that no further images can be obtained past that point and a *'void'* is produced in the image. This is commonly seen at tissue–bone interfaces and is why transthoracic echocardiography has its limitations, due to the ribcage and sternum, and trans-esophageal views are needed in some situations.

***'Point-of-care'* ultrasound** is a powerful addition to the clinician's armoury. However, its safe and effective use requires appropriate training and some understanding of the processes and physics involved in the generation of the image. Appreciation of these factors allows the operator to be aware of the potential for the generation of artefactual images and their recognition.

Potentially harmful effects of ultrasound

Ultrasound has many advantages as a mode of clinical imaging. It is relatively cheap (*although requires a trained operator*) and portable and can be used at the bedside of unstable patients in critical care or the emergency department. Images are obtained in real time and there is no exposure to ionizing radiation for patients or staff. Ultrasound is also, in general, a very safe medical procedure and it has a long-established use in imaging of the developing fetus.

At the right frequencies, Sound can also burn you, pop your eardrums and deteriorate your Kidneys, Liver, Lungs and other parts of your body including messing with your lymphatics and autoimmune systems and is often a preferred invisible torture in conjunction with electromagnetic waves by perpetrators upon Targeted Individuals (TI's).

According to American audio, video & thermal imaging forensics specialist Amy Holem, "I've heard stories from people around the world, too many times of lives being destroyed. Not just by Federal agencies and law enforcement, but by neighbors, friends, and family members as well. These crimes are being reported and nothing is being done to investigate or stop these vindictive, vile, vicious acts."

The Telecommunications of these criminal and perpetrators can be captured, the torment and torture can be proven. This article has presented what the writer's believe to be the basic core knowledge, readers are encouraged to do their own further research on the various soundwaves that maybe affecting them and/or if you find that you are one of those needing professional help or nowhere else to go, then look no further, a video or audio analysis contact a forensic sound professional in your local area like Amy, who can promptly assist you in finding out what type of acoustic sounds or weapons may be being used upon you, as Amy works with clients from all over the world.

Amy's Contact Information: Amy Holem | Aimee's Audios | (815) 307-4619 | AimeesAudios@protonmail.com

Conclusion

Sound has been used for centuries as a healing tool, with many different types of sound healing techniques being used to treat a variety of ailments. For example, Tibetan singing bowls are used to restore the normal vibrational frequency of the body, while the human voice is also being used to heal several ailments Sound healing is believed to help in the treatment of stress, depression, anxiety, post-traumatic stress disorder (PTSD), sleep problems, and chronic pain.

The Active Denial System (ADS) is a non-lethal directed-energy weapon developed by the U.S. military, designed for area denial, perimeter security, and crowd control. The weapon works by heating the surface of targets, such as the skin of targeted human beings, and has been used as a method of crowd control, which has caused permanent hearing damage, having an extremely high decibel capacity (up to 160 dB measured at one meter from the device).

LRADs, also known as sound cannons, are acoustic hailing devices that can emit sound at extremely high decibel levels. LRADs are capable of producing a level of sound up to 162 dB SPL, which is above the average auditory threshold of pain. According to HowStuffWorks, an LRAD device uses the phase of the sound waves, the size of the device and the properties of air to create more directional sound: The outer transducers aren't completely in phase with the inner transducers. The sound waves interact with one another, canceling out some of the outermost waves and making the sound less audible outside of the beam.

The use of sound as a form of crowd control is currently in the spotlight due to potentially harmful military-grade weapons such as flash-bangs and long-range acoustic devices (LRADs) being utilised with accelerating regularity at protests across the United States, Australia and elsewhere around the world.

Sound can also be incredibly dangerous to humans, if used incorrectly. Though, in order to dispel a few popular urban myths around the various types of sound weapons being used on TI's *and everyday people.* In recent years, many types of portable sound weapons have been produced for various government alphabet spy agencies, military and police for public policing purposes, and freely available for purchase by those with the right connections within the secret societies' networks, mainstream media groups and unscrupulous corporate criminal gangs like the Mafia.

These weapons are being used daily 24/7 on people known as Empowered individuals or more popularly known to most as Targeted individuals in many countries throughout the world, though the police and military are more inclined to use: Active Denial Systems (ADS) and LRAD 23 whenever there's public unrest or riots etc. These are not necessarily the acoustic/sound weapons they're frequently using on TI's, in most cases its more likely to be wireless Phased Arrays as their most preferred delivery method to the victim, Ultrasonics *(Ultra Low Frequencies)*, ELF *(Extra Low Frequencies)* and in areas where digital RF signals may not be able to reach the desired target, perpetrators are even utilising the services of Ham Radio operators using analogue frequencies...

It is important to note that the use of sound weapons raises serious ethical and moral concerns. The use of these weapons can cause permanent hearing damage and other health problems, and their use should be carefully regulated and monitored.

For more precise information on various sound and/or electronic weapons, give your local audio and video forensics experts a call, or feel free to contact Amy Holem on (815) 307-4619 for a Video/Audio Analysis and/or Thermal Scans & Imaging
https://www.aimeesaudios.com/