WiSTEM Sound Adventure

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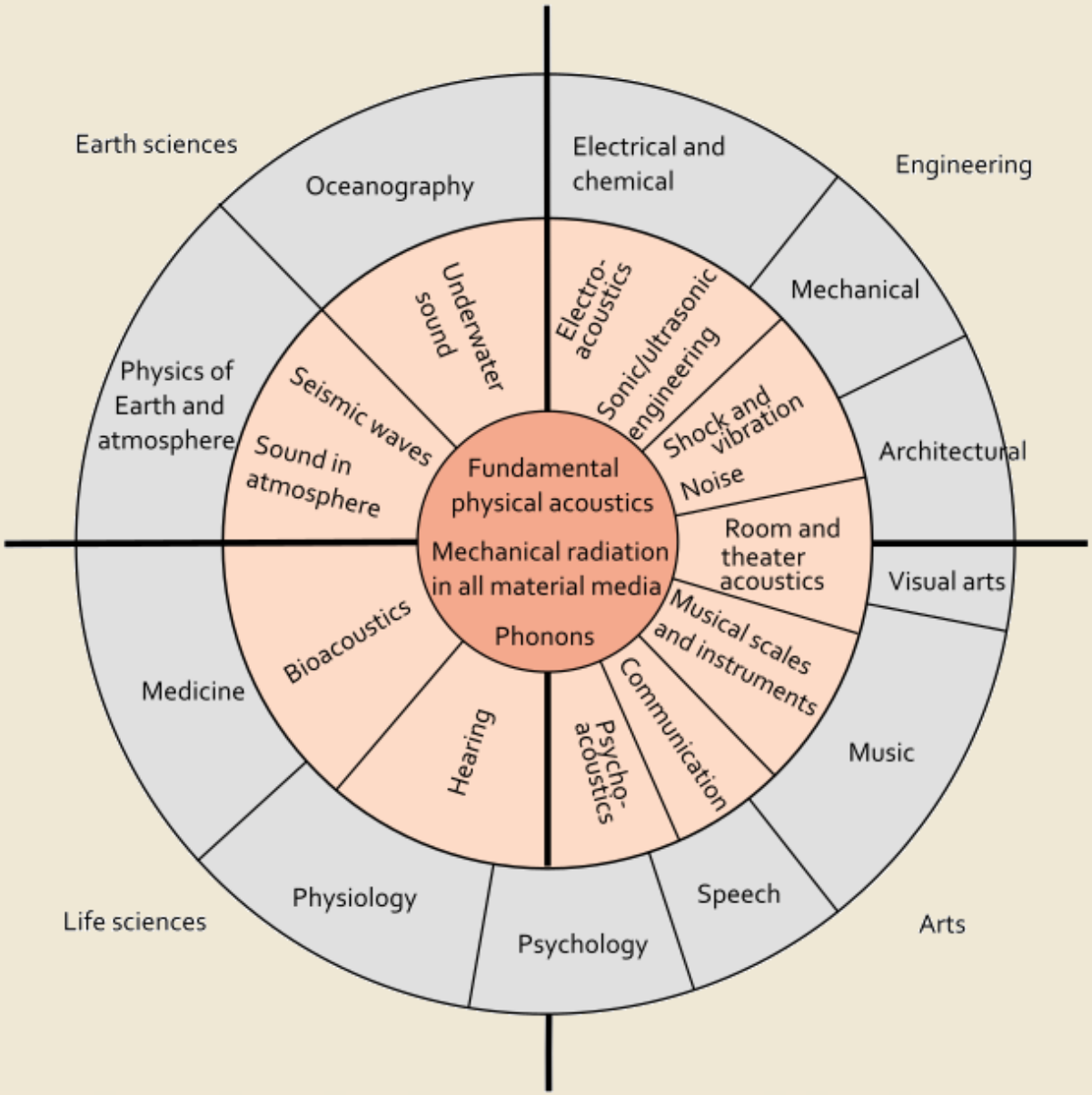
Lindsay's wheel of acoustics



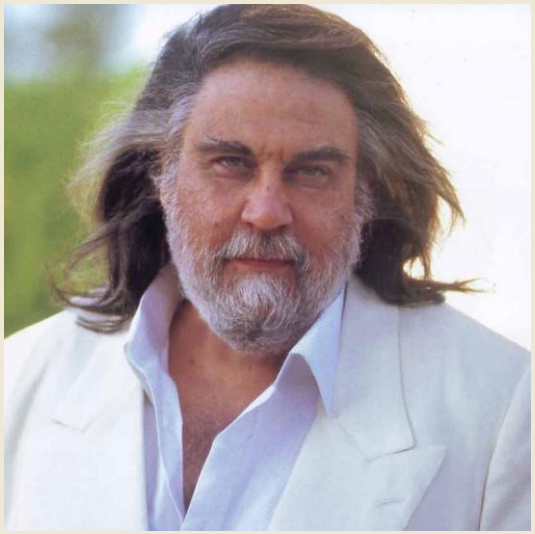
An illustrated Lindsay's wheel of acoustics

What is music? What is sound?

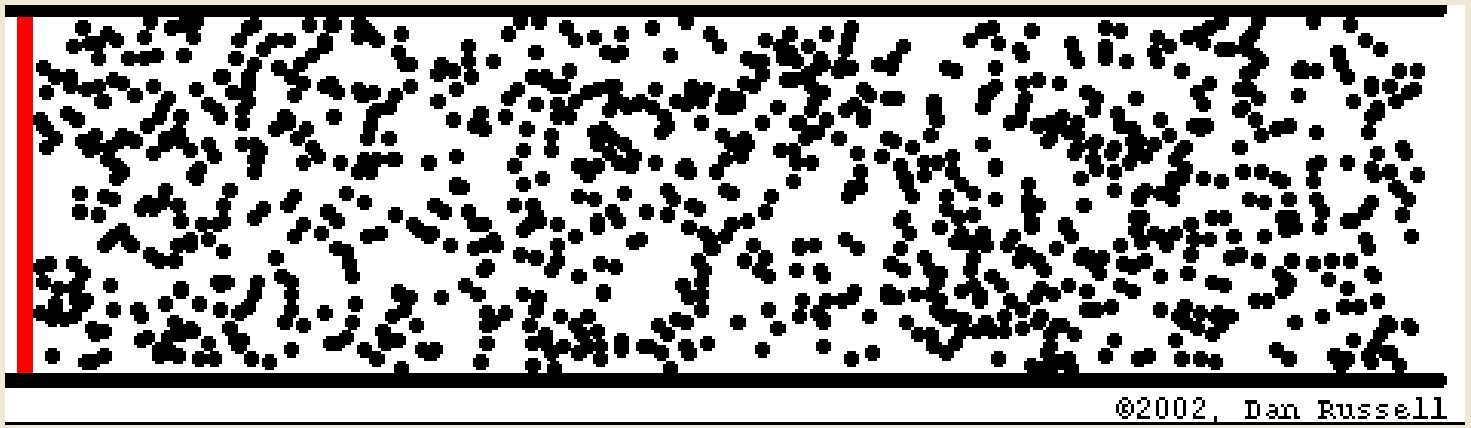
What is music? That is a very difficult question indeed…
--Diana Deutsch

Sound is the operational code of the universal dimensions and, simultaneously, a progenitor.

--Vangelis



Wave motion



The height of a wave is its AMPLITUDE.

ACOUSTICS is the science of sound.

The loudness of sound is characterized by DECIBELS.

Why do things oscillate?

$F = ma$ is NEWTON'S law

$F = -kx$ is HOOKE'S law

Masses oscillate when they feel an **acceleration** (*a*) in proportion to how far they **move** (*x*):

$$ma = -kx$$

The FREQUENCY of oscillation is $\sqrt{k/m}$

What makes an oscillation a *wave*?

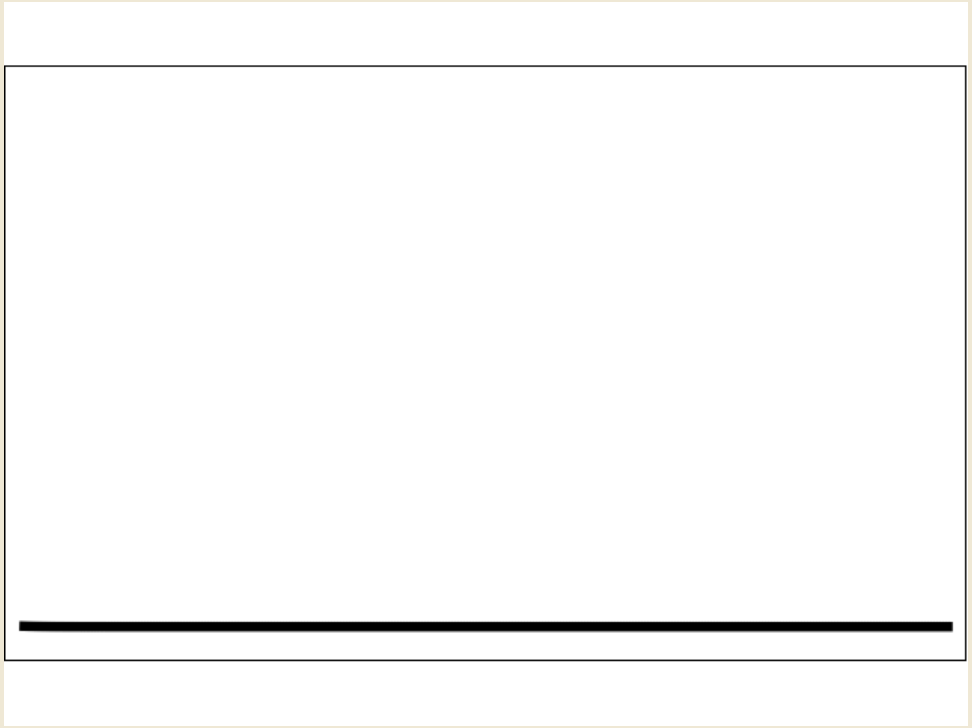
A WAVE oscillates in time *and* space.

$$f(x - ct)$$

c is the speed at which the wave travels.

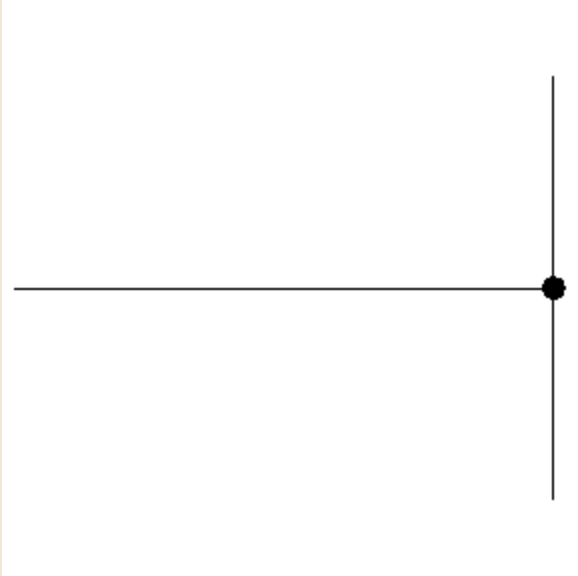
For sound waves, the function *f* is PRESSURE.

Superposition



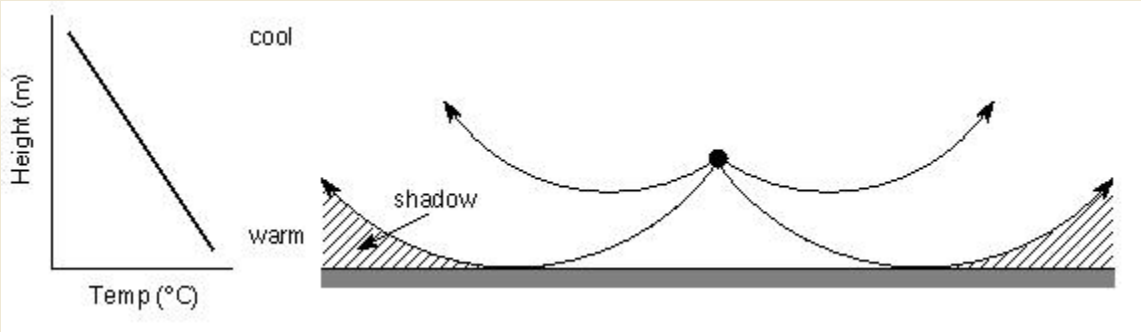
SUPERPOSITION states that waves can be added together.

Reflection



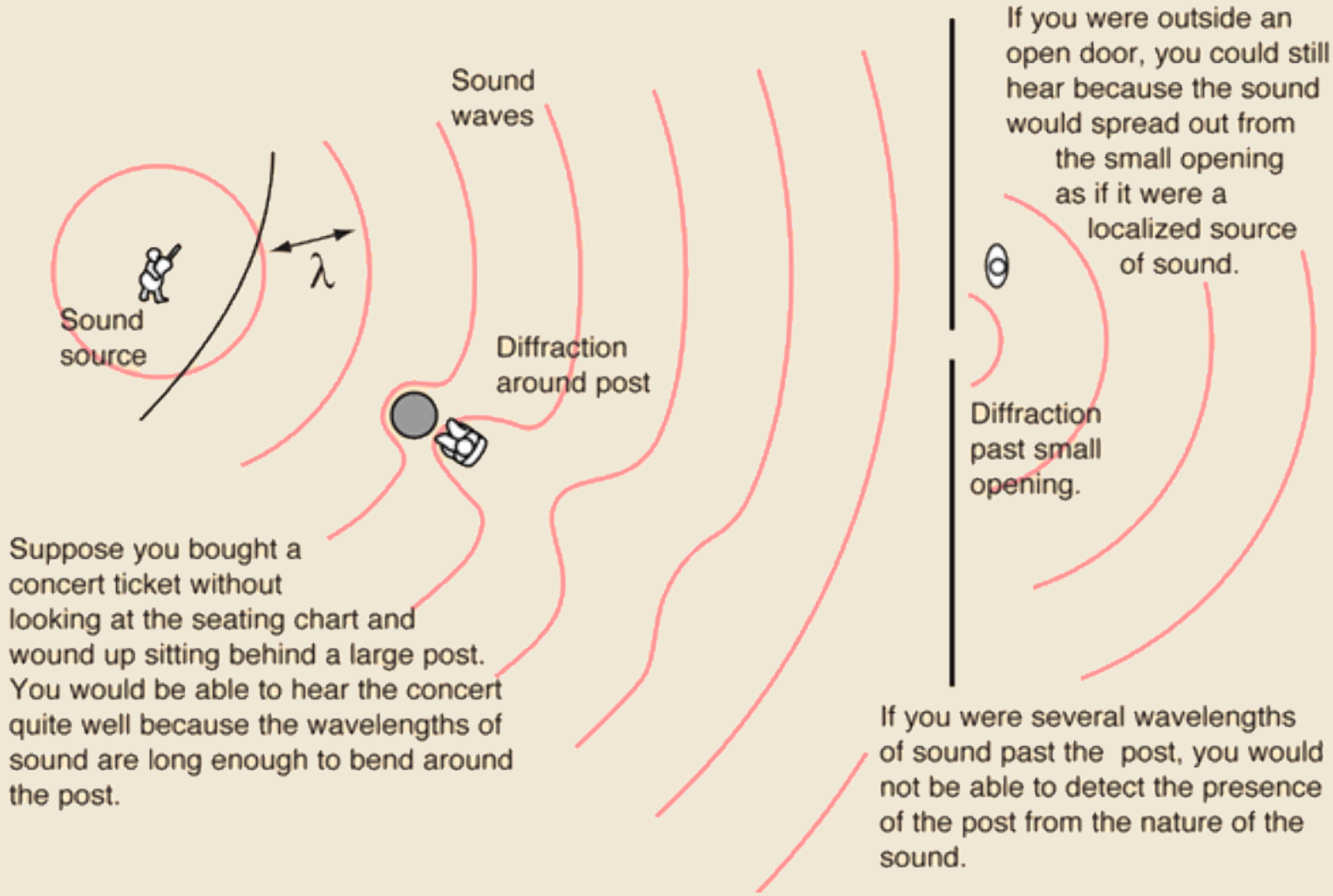
REFLECTION is the bouncing of waves off surfaces.

Refraction



REFRACTION is the bending of waves upon entering a different medium.

Diffraction

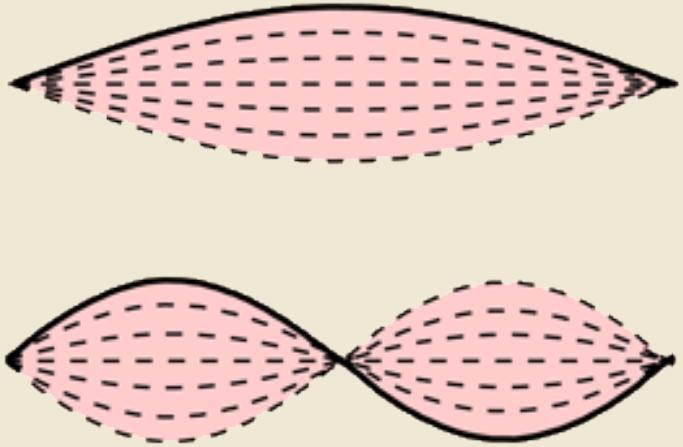


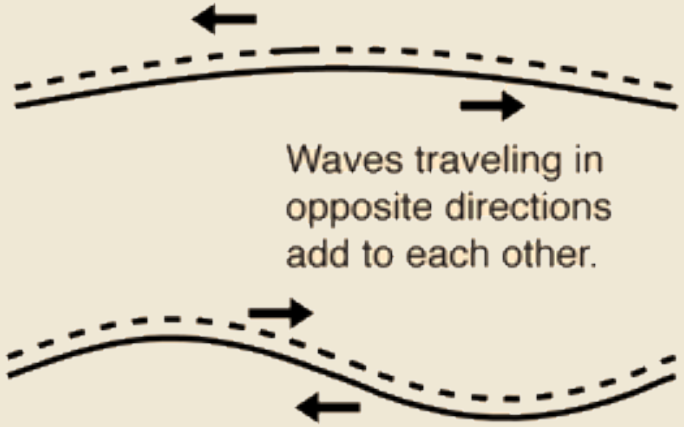
DIFFRACTION is the spreading and interference of waves in space.

Rays

At high frequencies, sound (and light) is described by arrows called RAYS.

Harmonics





HARMONICS arise due to waves being confined by two boundaries.

HARMONICS form the basis of HARMONY, which, along with RHYTHM, MELODY, and TIMBRE, form the basis of MUSIC.

Silence

Acoustic waves arise and subside in SILENCE.

Word bank for crossword puzzle

NEWTON
HOOKE
AMPLITUDE
DECIBEL
FREQUENCY
ACOUSTICS
WAVE
PRESSURE
SUPERPOSITION
REFLECTION
REFRACTION
DIFFRACTION
RAY
HARMONIC
MUSIC
HARMONY
RHYTHM
MELODY
TIMBRE
SILENCE