Paradoxical touch

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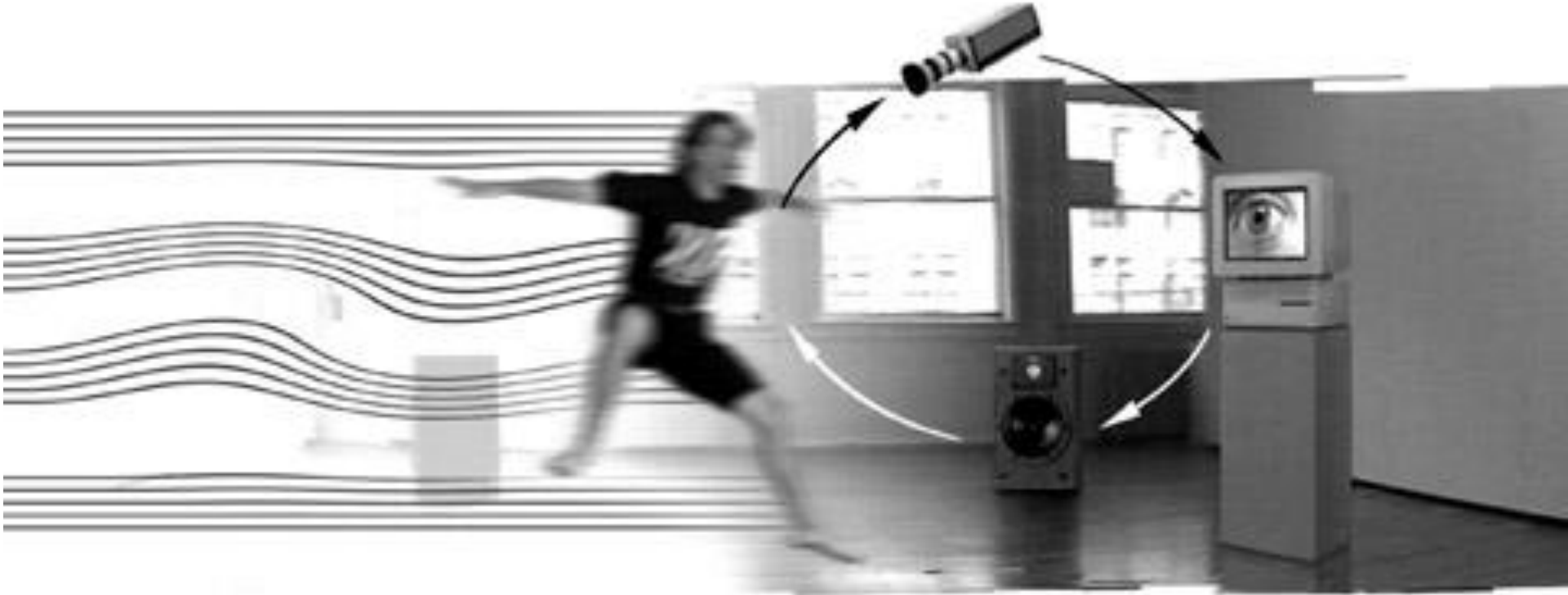
David Rokeby
(Very Nervous System)



Paul Sermon (Telematic Dreaming)

- https://vimeo.com/172379550
- https://vimeo.com/34832958

Trompe-l'oeil

A hand for an eye

…versus 3D

- Recovery of the interval
- Navigation in the 3rd dimension


The meaning of « trompe-l’œil »

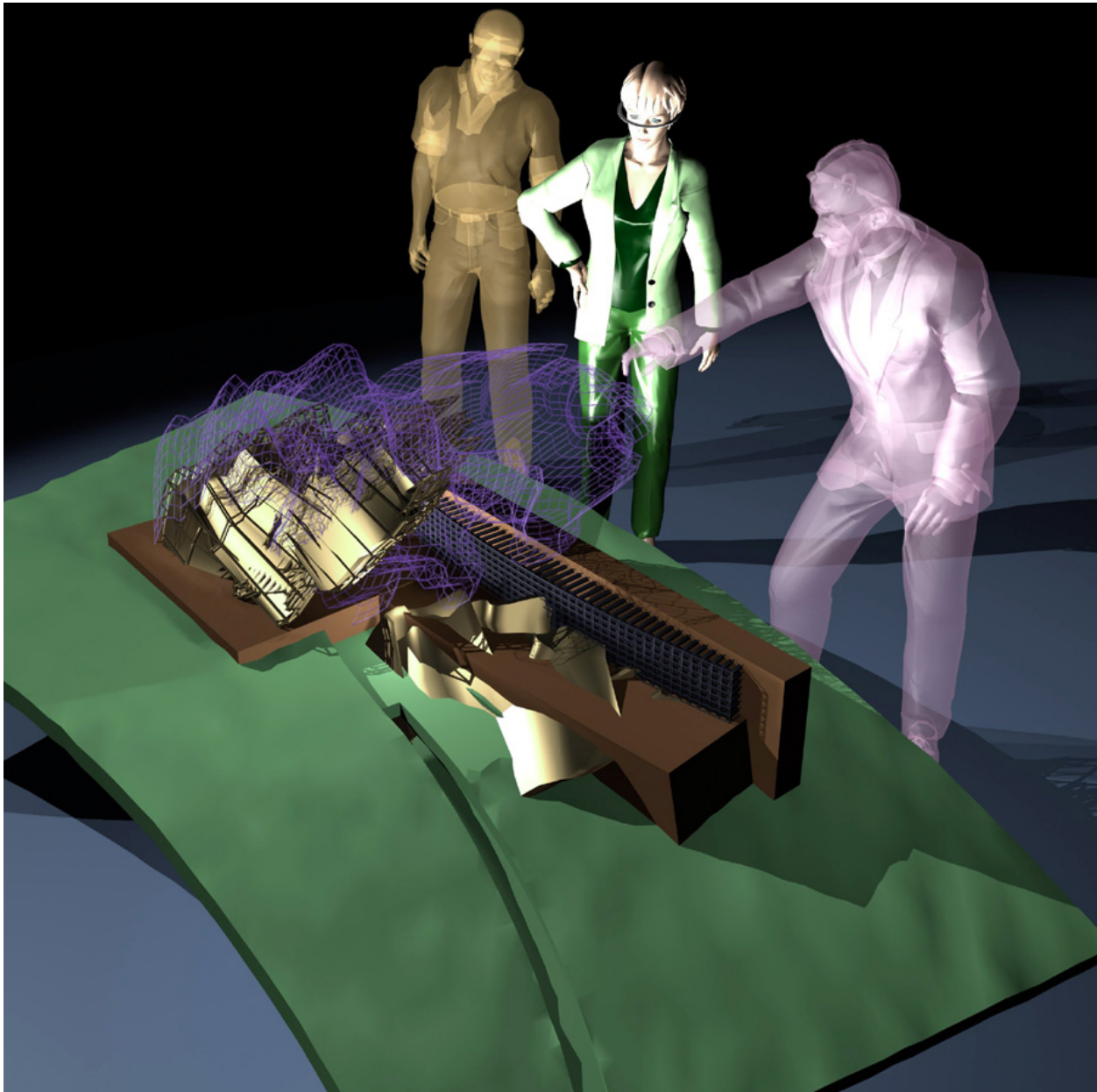
…versus 3D

Reversal of perspective

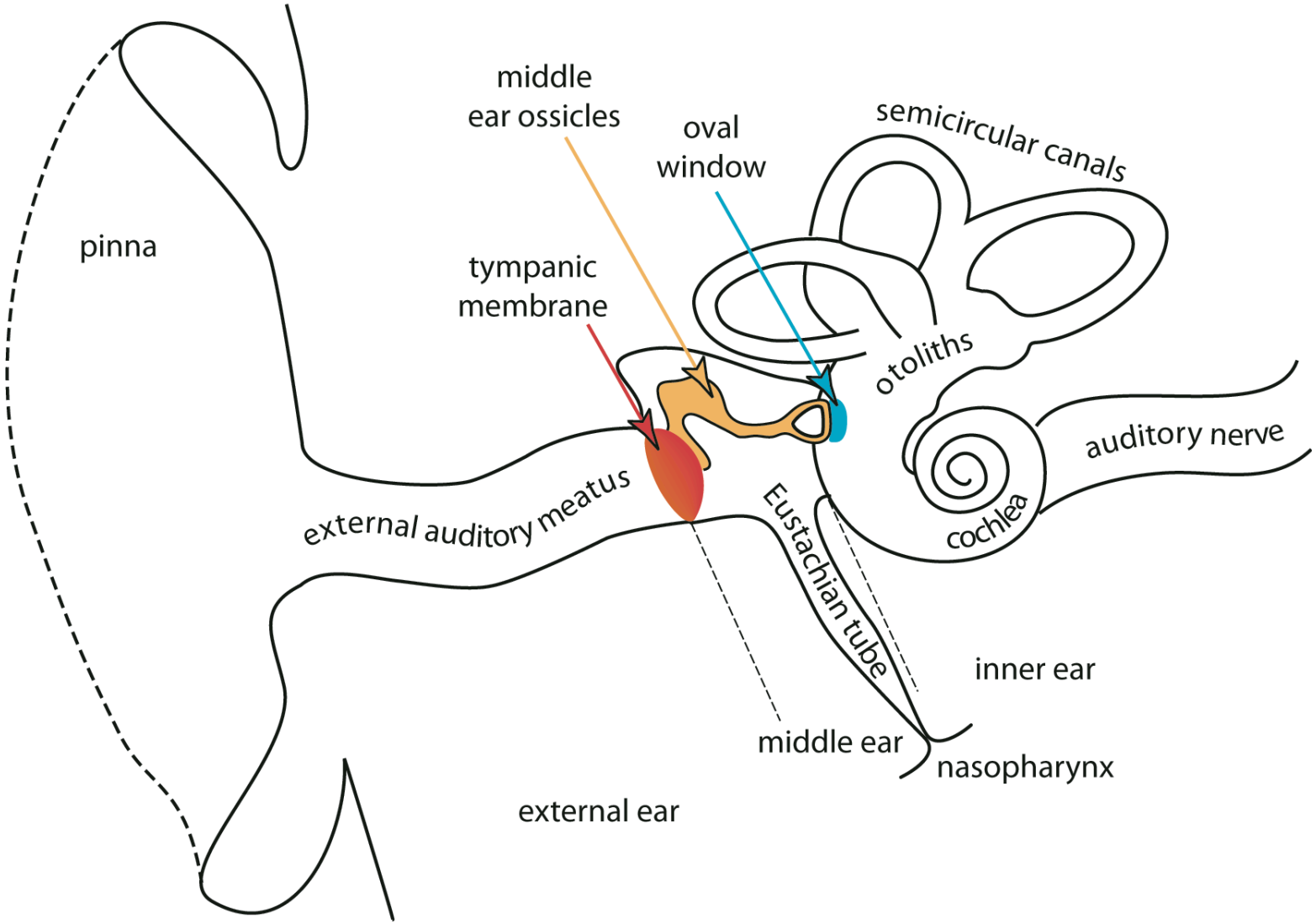
“End of theory”

Multimedia: recovery of the other senses into the image

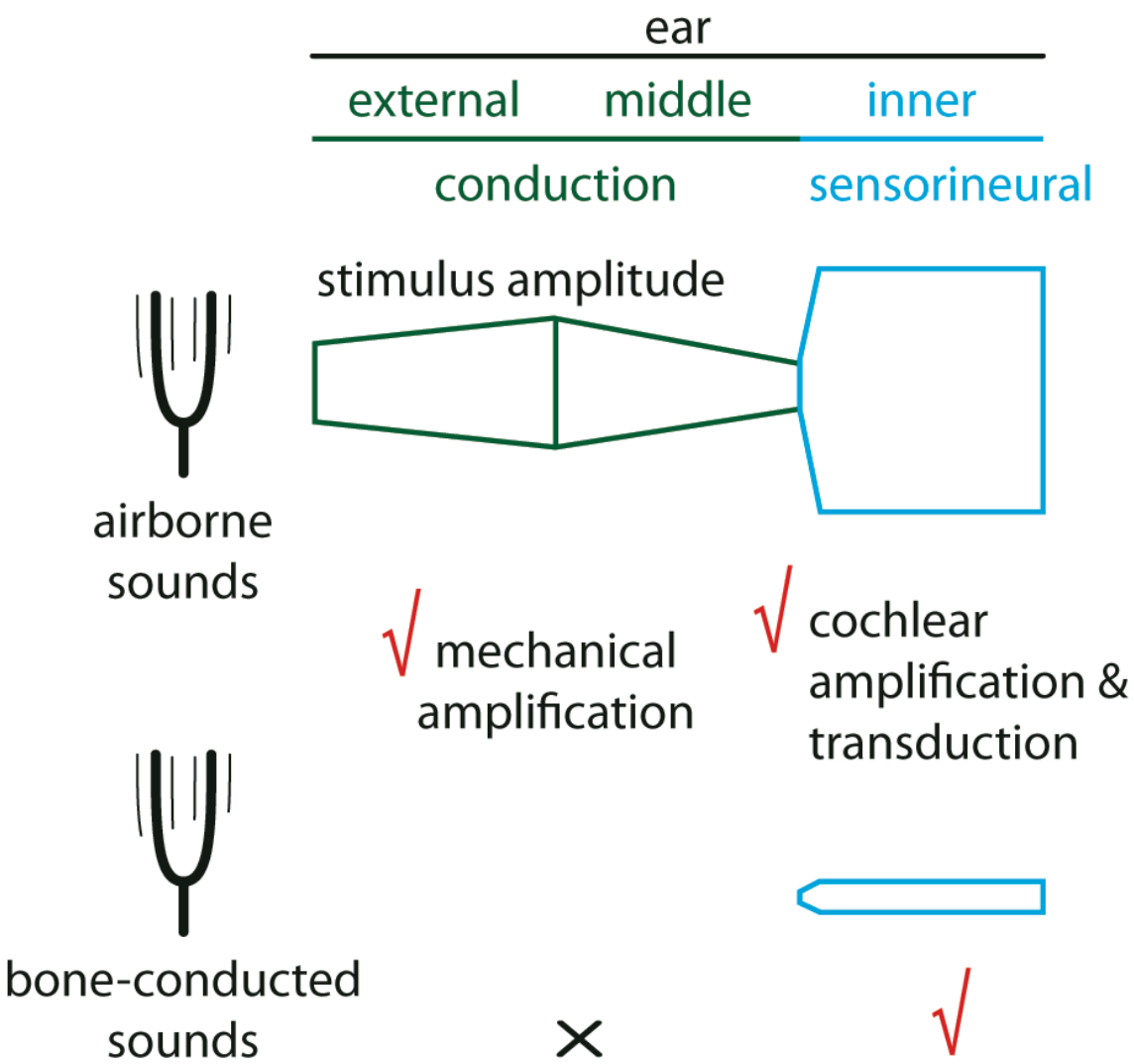
VR: wearing the image as an extension of the skin



I. THE BASICS


middle
ear ossicles
oval
window
semicircular canals
pinna
tympanic
membrane
otoliths
auditory nerve
external auditory meatus
Eustachian tube
cochlea
inner ear
middle ear
nasopharynx
external ear

Airborne vs. bone conduction



Bone conduction is the conduction of sound to the inner ear through the bones of the skull

Bone conduction is the reason why a person's voice sounds different to him/her when it is recorded and played back. Because the skull conducts lower frequencies better than air, people perceive their own voices to be lower and fuller than others do. This also explains why a recording of one's own voice sounds higher than one is accustomed to.

Bone Conduction

Two types of bone conduction are recognized:

Compressional: Bite your guitar (whole skull)

Inertial: Tooth radio (High frequencies – ear casing)

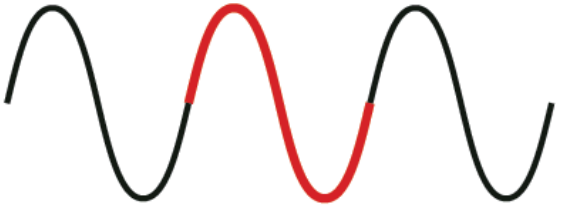
Harmonics and phases in airborne sound

The frequency of a sound is a major influence upon the perceived pitch. A pure tone, such as middle C, has a fundamental frequency (f_0), the number of cycles per second.

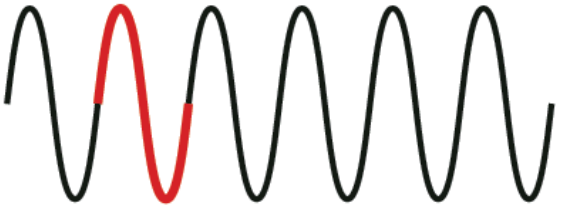
Harmonics of a tone are tones at frequencies that are integral multiples of the fundamental frequency. The first harmonic (A2) is a sinusoidal wave with double the frequency and half the period, the second harmonic (A3) is a sinusoidal wave with triple the frequency and a third of the period, and so on.

Sound frequency ≈ pitch

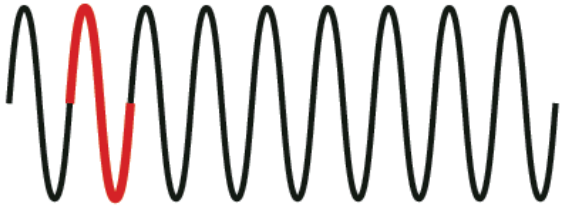
A1. fundamental f_0
period=$1/f_0$



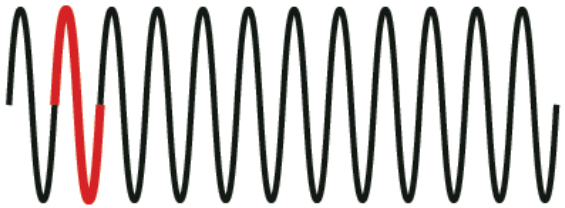
A2. 1st harmonic
frequency = $2*f_0$
period=$1/2*f_0$



A3. 2nd harmonic
frequency = $3*f_0$
period=$1/3*f_0$

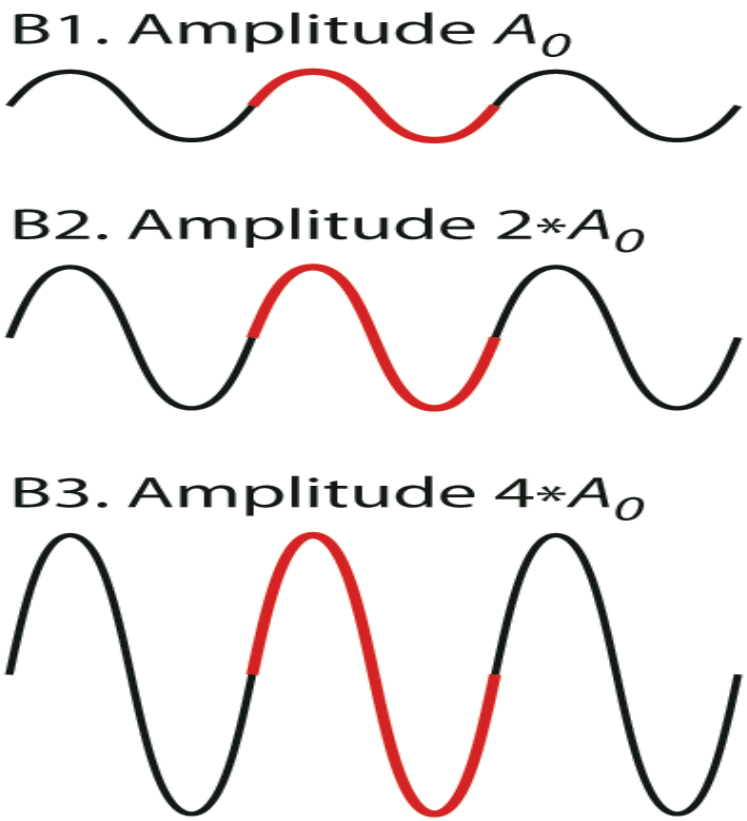


A4. 3rd harmonic
frequency = $4*f_0$
period=$1/4*f_0$



The case of noise cancelling technologies
Phases in electronically treated sound

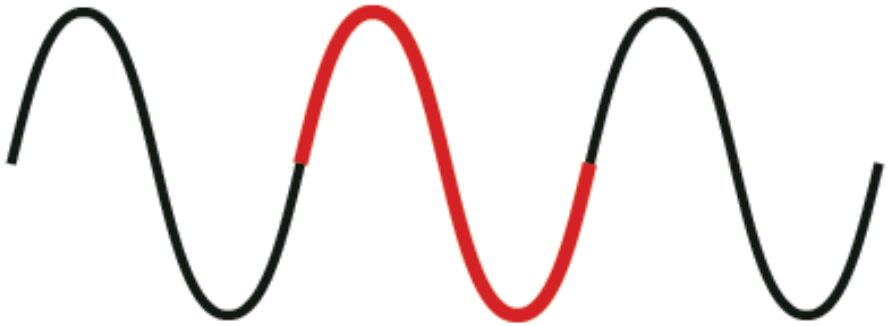
Sound amplitude ≈ loudness



The amplitude of a sound wave is a major influence upon the perception of loudness. Amplitude can increase (B1–B3) without affecting the period (*shown in red*) or frequency.

NOISE REDUCTION

C1. phase θ



C2. phase shift

NOISE REDUCTION

A noise-cancellation speaker emits a sound wave with the same amplitude but with inverted phase (also known as antiphase) to the original sound. The waves combine to form a new wave, in a process called interference, and effectively cancel each other out - an effect which is called phase cancellation.

The resonant interval

This is not necessarily good news for the quality of the sound. However all earphones technologies increase the participation of the body in tactile appreciation of sound.

II. SOUND INSTRUMENTS OF THE DIGITAL AGE

From the persona to earphones

The first megaphone

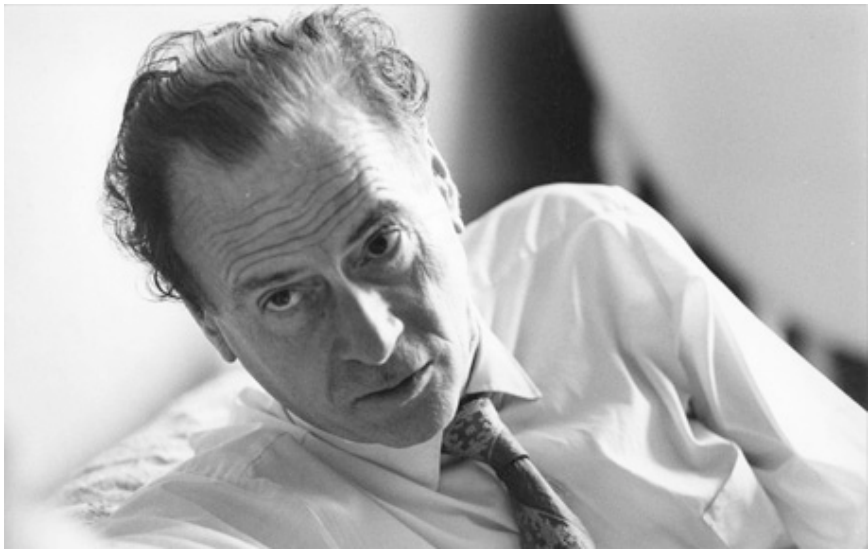
Carving the ear

- From Jazz to hiphop
  - Total surround
- The return of touch

- **All airborne sound until the invention of the telephone (first loss of harmonics)**
- **In digital media, sampling limits the range of harmonics and mixing manipulates the proportion of frequencies.**

Audile-tactile space is the space of involvement. We "lose touch" without it.

Visual space is the space of detachment…



Total Surround

The reversal of perspective in VR and 3D technologies highlight the information coming from sound and touch

The body as an instrument

The fascination with 3D sound and image environments

III. SOUND AND TOUCH

A new emphasis on tactility

Physical interaction with the objects of our attention

Versus Paracelsus: The skin is an extension of the ear, and not the other way around.

"We're suggesting that the ear evolved out of the skin in order to do more finely tuned frequency analysis"

Neuroscientist Elizabeth Courtenay Wilson

The Point of Being versus the Point of View

- The purpose of art:
- Donner un sens plus pur aux mots de la tribu

Musical innovation = tuning or re-tuning the ear

Anton Ehrenszweig:

Generation gap between young and old musical tastes

Young more accustomed to listen to sounds and instruments their elders either couldn't or wouldn't hear.

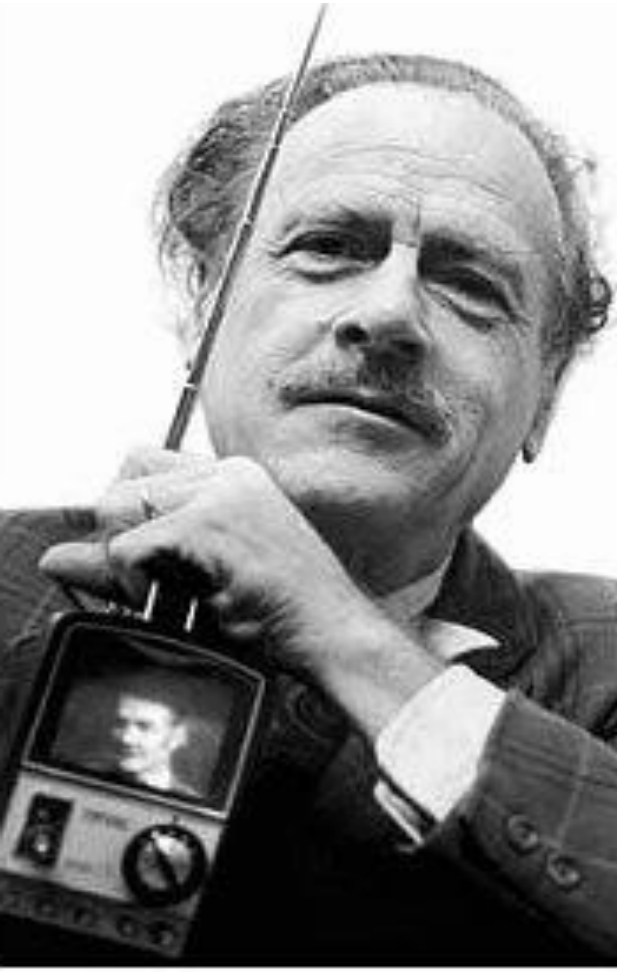
Possibility that younger are readier to absorb new sound experiences and higher levels of decibels.

Anton Ehrenszweig

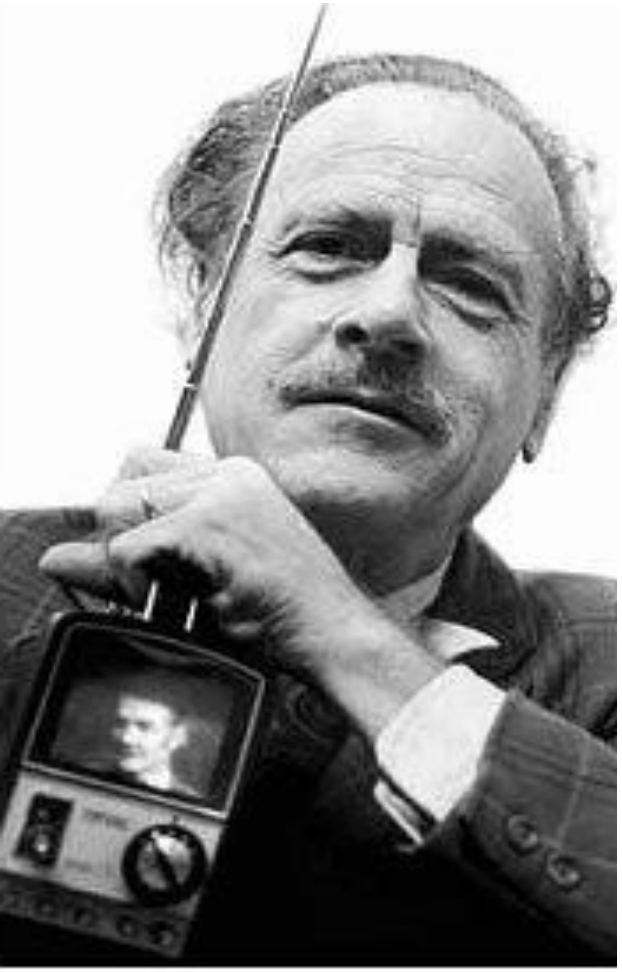
Explanation: sounds espouse and reflect their environment conditions including changes in technology (say the appearance of the electric guitar, or earlier, the shift from the harpsichord to the pianoforte and then to the piano) that encouraged the creation of entirely new types of rhythms, melodies, harmonies and pure sound productions.

IV. TOWARDS A NEW EAR(A)

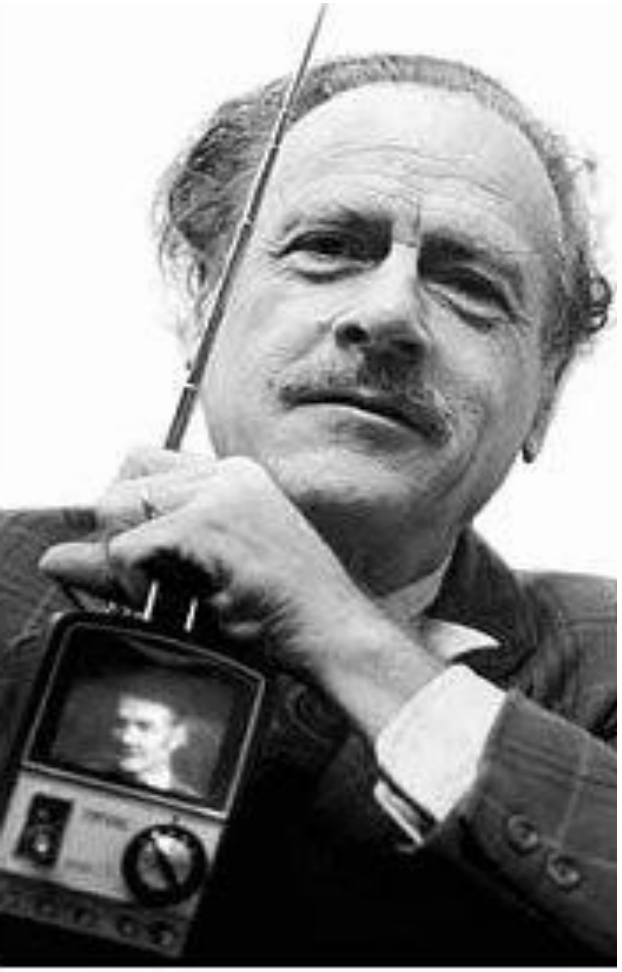
Remix, sampling, manipulation of sound, DJ, rappers, rapid acceleration, augmentation of the field of sound – cell phones



The disc jockey who appears to be manipulating a record player is, in fact, applying this technique to the hidden service *ground* of radio. The disc as product, when crossed with the radio *ground*, activates a vast new world of musicians and consumers of music.



The radio-created *ground* provides instant access to a new public diversified in age and condition. The LP disc creates new needs and new markets by assuming the hidden *ground* of radio. The service environment of radio is almost coextensive with the entire consumer market.

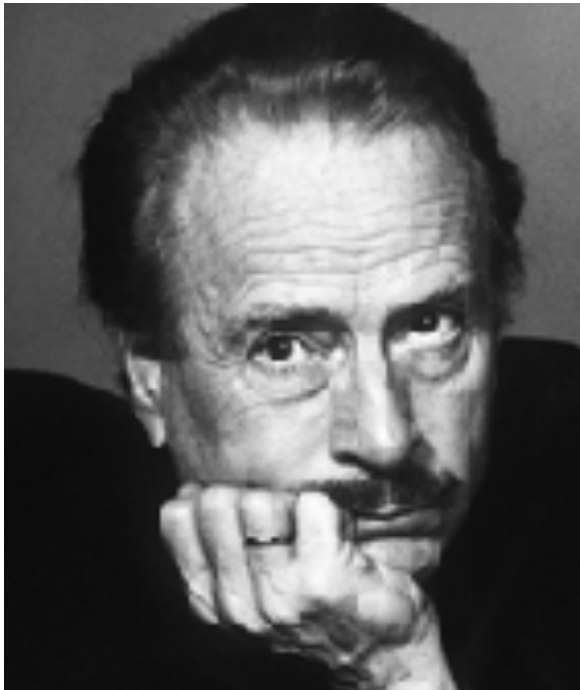


And the disc jockey has direct access to this vast world, which is potentially in the disc itself as product. It does not follow that the same disc jockey could create a similar market either for audio or video "cassettes." The *figure-ground* or host-medium relations undergo far-reaching change with the slightest modification of design or service.

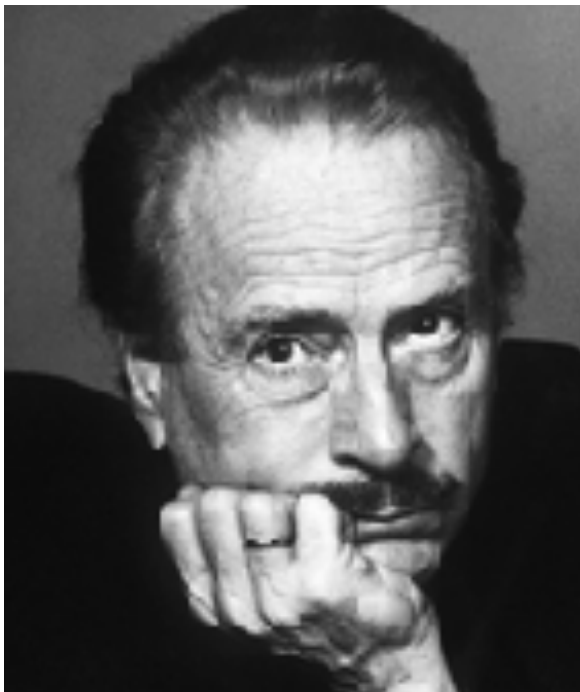
And the fury?

Since the spoken word is more emotionally laden than the written — conveying by intonation such rich emotions as anger, joy, sorrow, fear — tribal man was more spontaneous and passionately volatile.

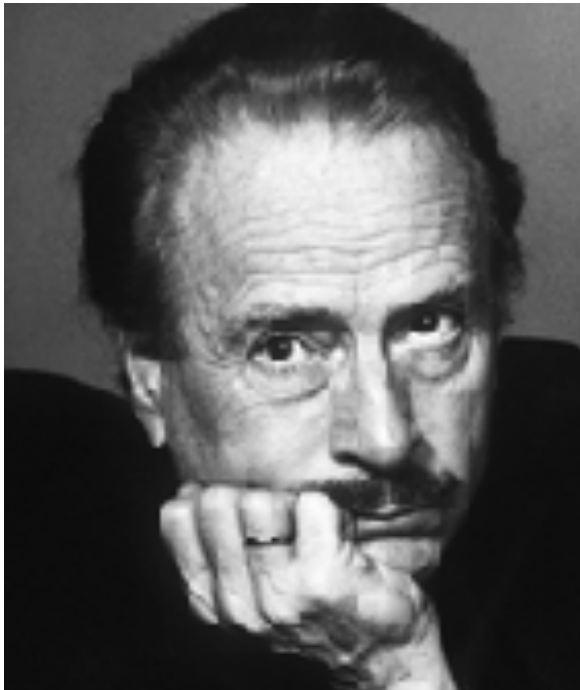
Once we have surrendered our senses and nervous systems to the private manipulation of those who would try to benefit from taking a lease on our eyes and ears and nerves, we don't really have any rights left. Leasing our eyes and ears and nerves to commercial interests is like handing over the common speech to a private corporation, or like giving the earth's atmosphere to a company as a monopoly.



Electromagnetic technology requires utter human docility and quiescence of meditation such as befits an organism that now wears its brain outside its skull and its nerves outside its hide. Man must serve his electronic technology with the same servo-mechanistic fidelity with which he served his coracle, his canoe, his typography, and all other extensions of his physical organs.



But there is this difference, that previous technologies were partial and fragmentary, and the electric is total and inclusive.



The Auditory Imagination

What I call the auditory imagination is the feeling for syllable and rhythm, penetrating far below the conscious levels of thought and feeling, invigorating every word, sinking to the most primitive and forgotten, returning to the origin and bringing something back, seeking the beginning and the end. It works through meaning…and fuses the old and obliterated and the trite, the current, and the new and surprising, the most ancient and most civilized mentality. (T.S. Eliot)