



# *Engineering in Recording*

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- *Is Recording Engineering?*
- Some definitions of record engineering
  - Schoenberg's 'sound men'
  - A heated debate
  - The third discipline
- Three recording (engineering) scenarios
  - time-domain processing
  - dynamic range control
  - microphone array design

# *Is Recording Engineering?*

*Understanding between professionals, educators and students  
Greater industry awareness  
Identify engineering in the recording studio*

*Research outputs and archive  
Guidance for students, professional bodies & educators  
Public engagement with questions relating to engineering*



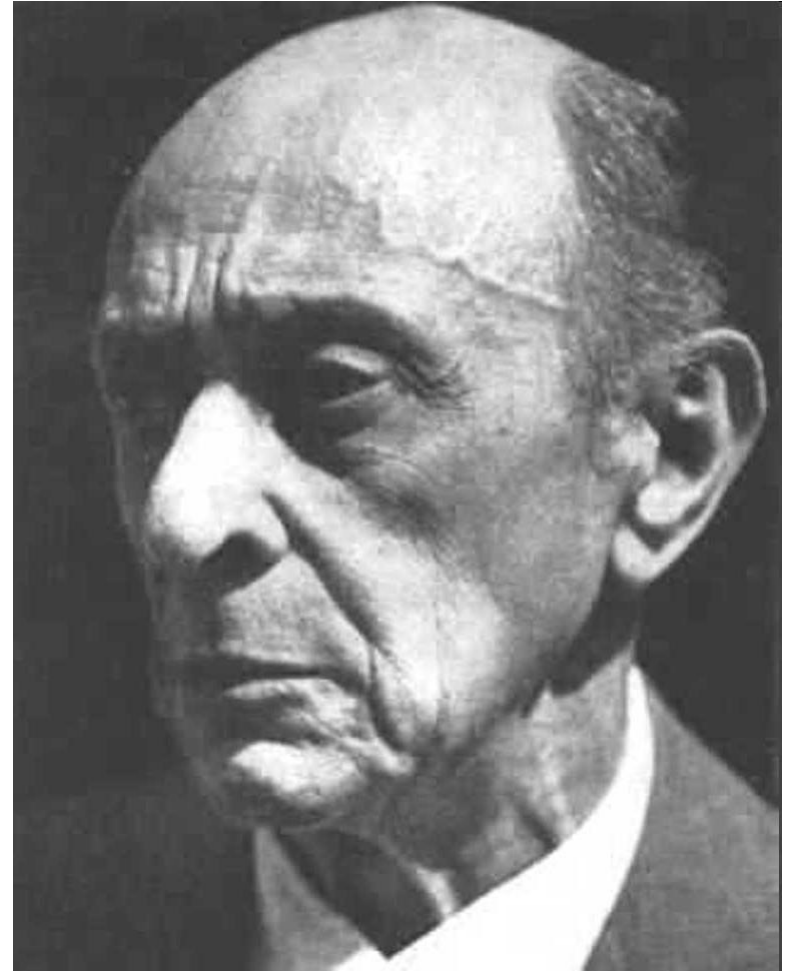
The Royal Academy  
of Engineering



# Schoenberg's 'sound men'

*“should be able to study a score and build up in his imagination a perfect image of the sound of this score. His ear training shall then enable him*

*a) to find out whether or not a recording harmonizes with the image in his imagination;*

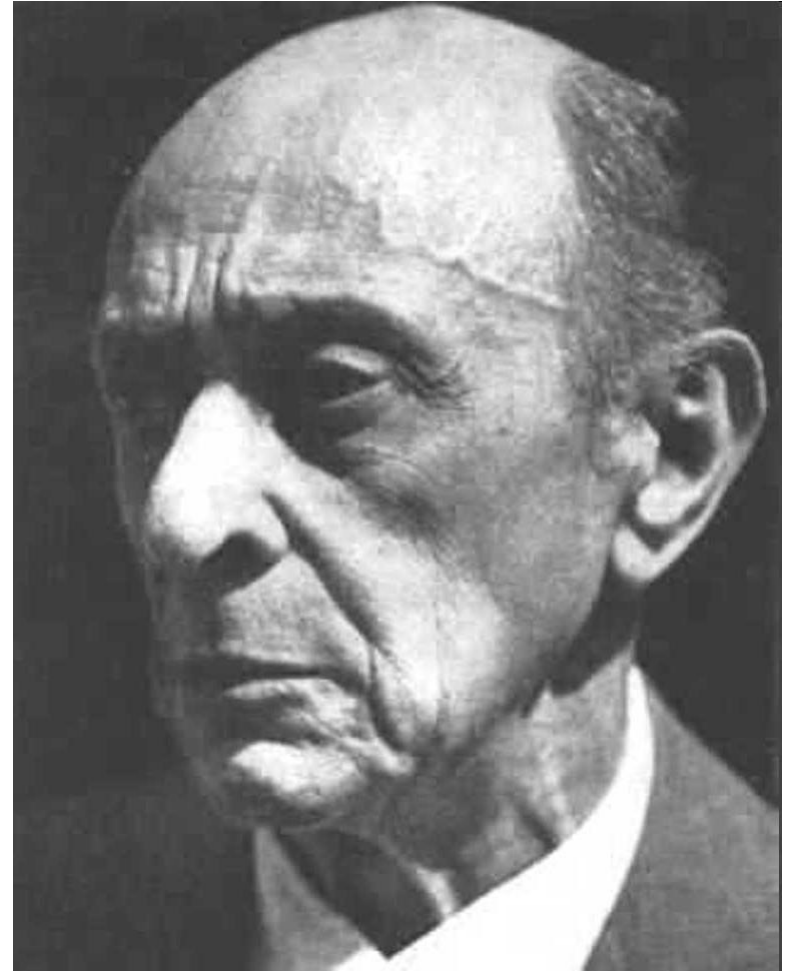




# Schoenberg's 'sound men'

*“should be able to study a score and build up in his imagination a perfect image of the sound of this score. His ear training shall then enable him*

*b) to define exactly the differences between his image and the sound of the recording;*

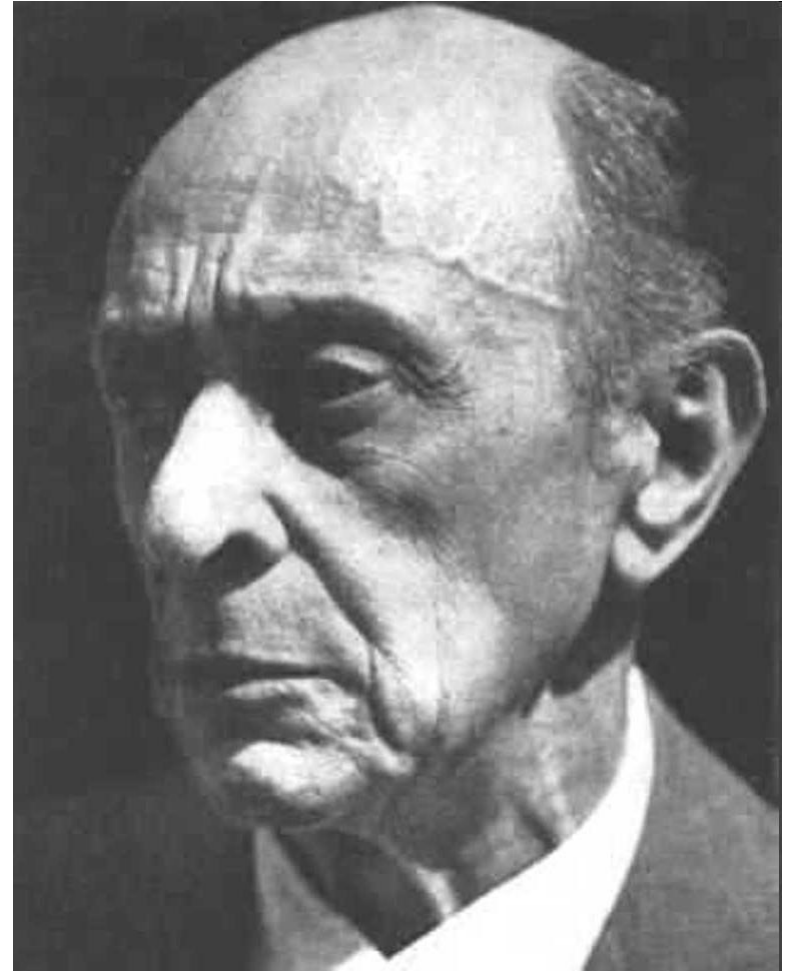




# Schoenberg's 'sound men'

*“should be able to study a score and build up in his imagination a perfect image of the sound of this score. His ear training shall then enable him*

*c) to indicate what should be corrected and how;*

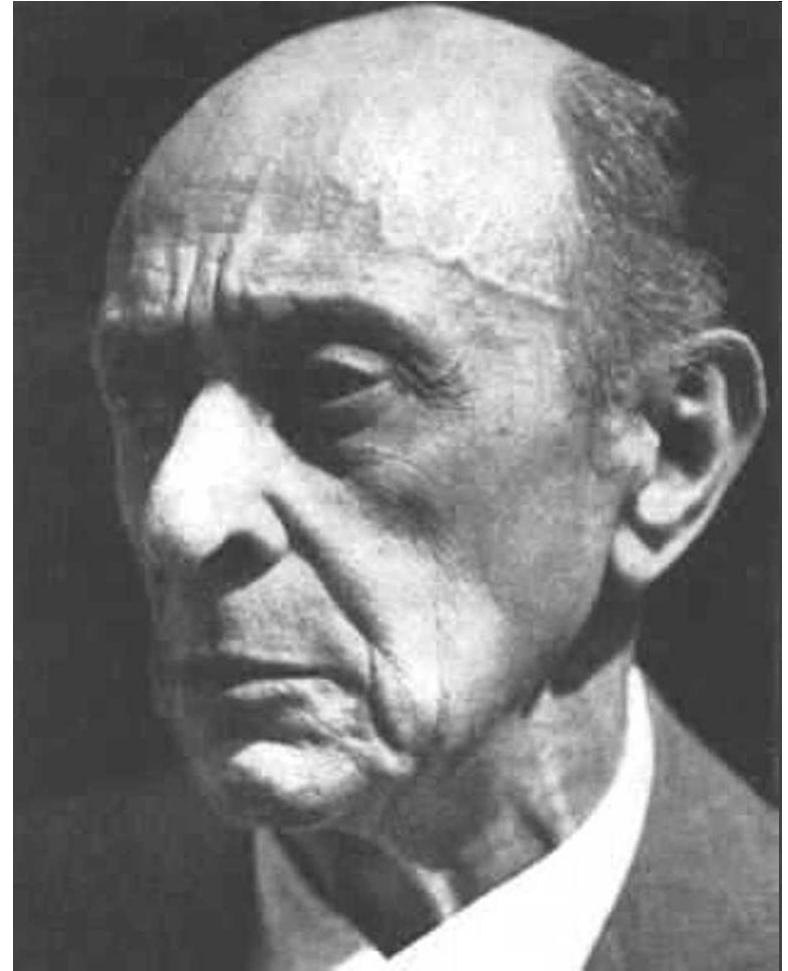




# Schoenberg's 'sound men'

*“should be able to study a score and build up in his imagination a perfect image of the sound of this score. His ear training shall then enable him*

*d) to if necessary suggest or even carry out such mechanical improvements of all acoustic, physical or mechanical devices as might be necessary for the case in question.”*





“We engineer the music that comes out of the speakers just as you engineer the electricity that flows through devices. We are not simple operators of the equipment, it is a creative field.”

“You do not design anything. You are not creating new equipment and technologies. Yes you do a creative job, but it is still not engineering.”





## *A third discipline?*

Engineering can be said to predate science, which is still relatively young, and man's development has been, and *still is*, determined essentially by his capacity to make artifacts and improve upon his environment rather than the systematic accumulation of knowledge [Lewin, 1983].



(1)

The application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software.

(2)

The study of approaches as in (1).

[IEEE Computer Society]



Engineering is explaining why a particular solution to a problem is the best.

*[Engineering Rhetoric and Thinking, Robinson, 1998]*



Operator - presets

Craftsperson – recipes for predetermined outcomes

Engineer – Application of science and numeracy to repeat *and* innovate



- Delay → ADT, chorus, flanging, Doppler shifting
- Operator
  - able to summon preset configurations
- Craftsperson
  - understands spectral effects achieved by short time delay
  - able to construct effects from 'cook book' recipes
  - can make basic connections between parameters and perception
- Engineer
  - Able to understand and apply acoustics and psychoacoustics
  - understands time/frequency duality, superposition etc.
  - has numeracy to *predict* outcomes



- VST 2.3
- Delay: 0 – 1000ms
- F'back: 0 – 100%
- LFO: 0 – 20 Hz
- Depth: 0 – 100 %
  
- Uses: delay, chorus, flanger, pitch shifter



operator → craftsperson → engineer



## *Rayleigh's wisdom*

Directly or indirectly, all questions connected to sound must come for decision to the ear, and from it can be no appeal. But we are not therefore to infer that all acoustical investigations are conducted with the unassisted ear. When once we have discovered the **physical phenomena which constitute the foundation of sound**, our explorations are in great measure transferred to another field lying within the **dominion of the principles of Mechanics**. Important laws are in this way arrived at, to which the **sensations of the ear cannot but conform**.

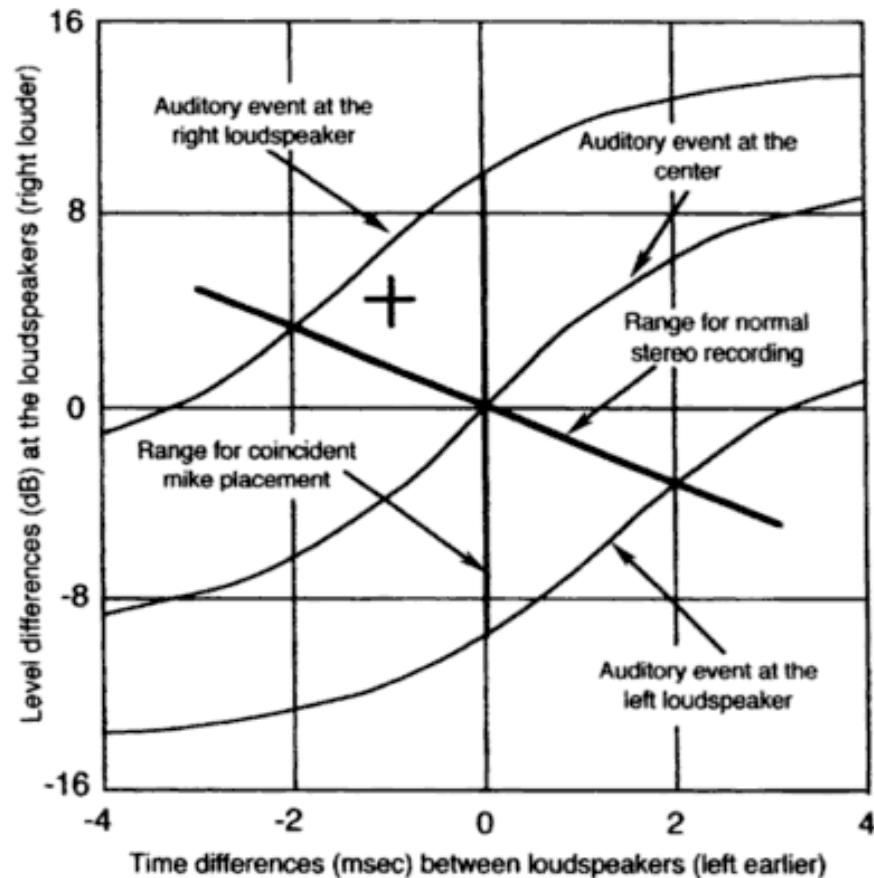


- loudness → short-time RMS (but not exactly!)
- requires understanding of:
  - $0 \text{ dB}_{\text{FS}}$  as a concept, reconstruction filters as integrators
  - temporal/simultaneous masking as a psychoacoustic process
  - dynamic range control as AM in digital signals
    - aliasing, transient overshoot, conditioning of the control signal
- Operator
  - presets
- Craftsperson
  - experience of trial and error, know ‘what works’
- Engineer
  - understand, know what to listen for, where to focus attention





# Time v amplitude panning



[*Handbook of Recording Engineering*, Eargle; Data: Franssen]



# Scenario 3: mic array design

- Understanding of many factors
  - auditory localisation
  - inter-channel amplitude/time differences → ITD and ILD cues
  - inter-channel coherence/correlation
  - room acoustics
  - electroacoustics
- operator
  - can only use prescribed methods, no adaptation
- craftsperson
  - able to adapt to situation but only via trial and error
- engineer
  - can design optimum (possibly bespoke) arrays



- VST 2.3
- $0 \rightarrow -\infty$
- $-100 \rightarrow 100$  ms
- Uses: panning (!), reproduction and estimation tests



## Contact Details...



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*Is Recording Engineering?* blog

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