

Sound Fundamentals

2



Phase

Multiple sounds (single or multiple sources) can arrive at the same time but at different points in their cycles.

Phase variations = time delay between two or more waveforms.

In phase, out of phase, or partial phase.

Header

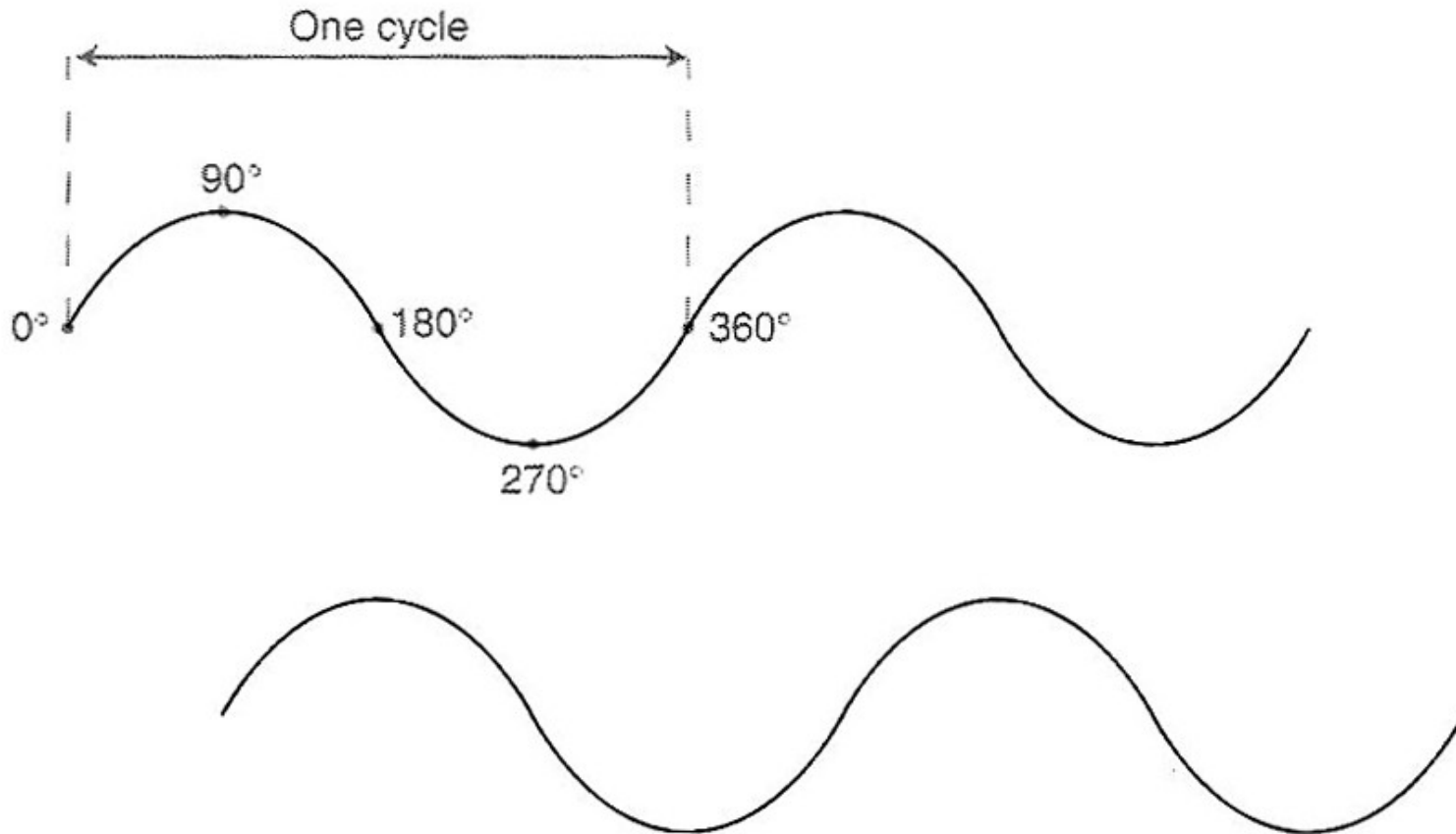
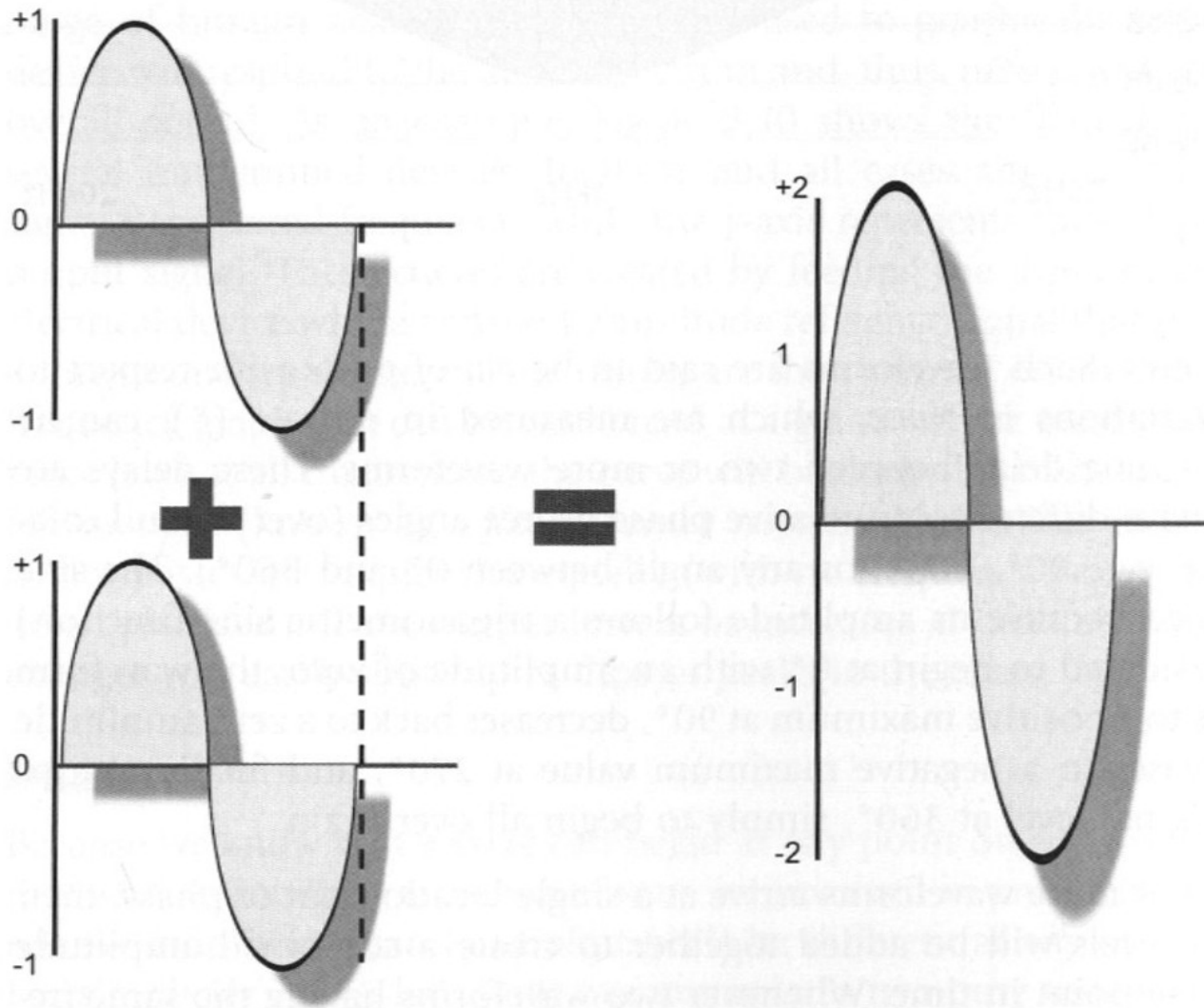


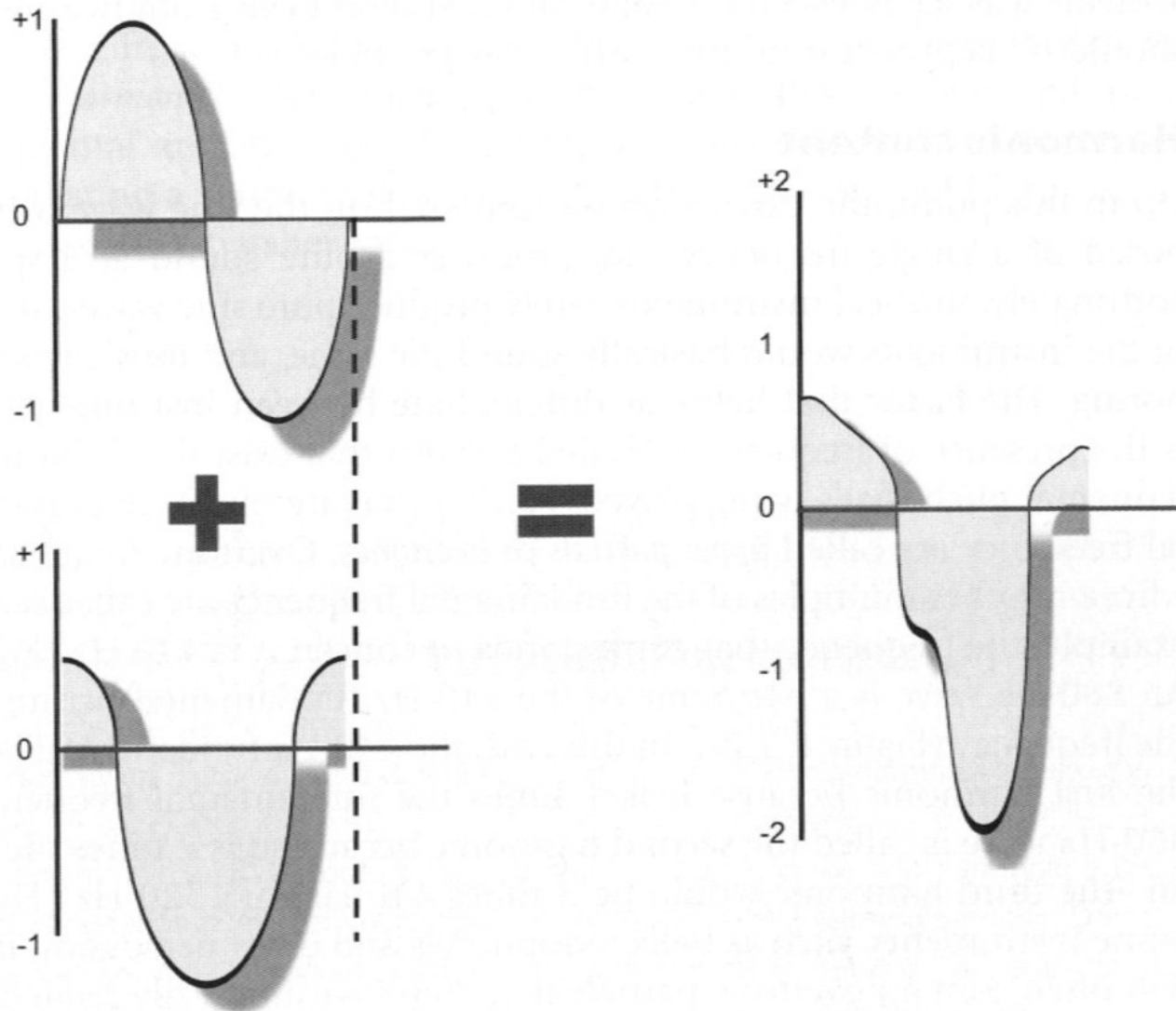
Figure 11.1 Two identical waveforms 90° out of phase with each other.

Phase



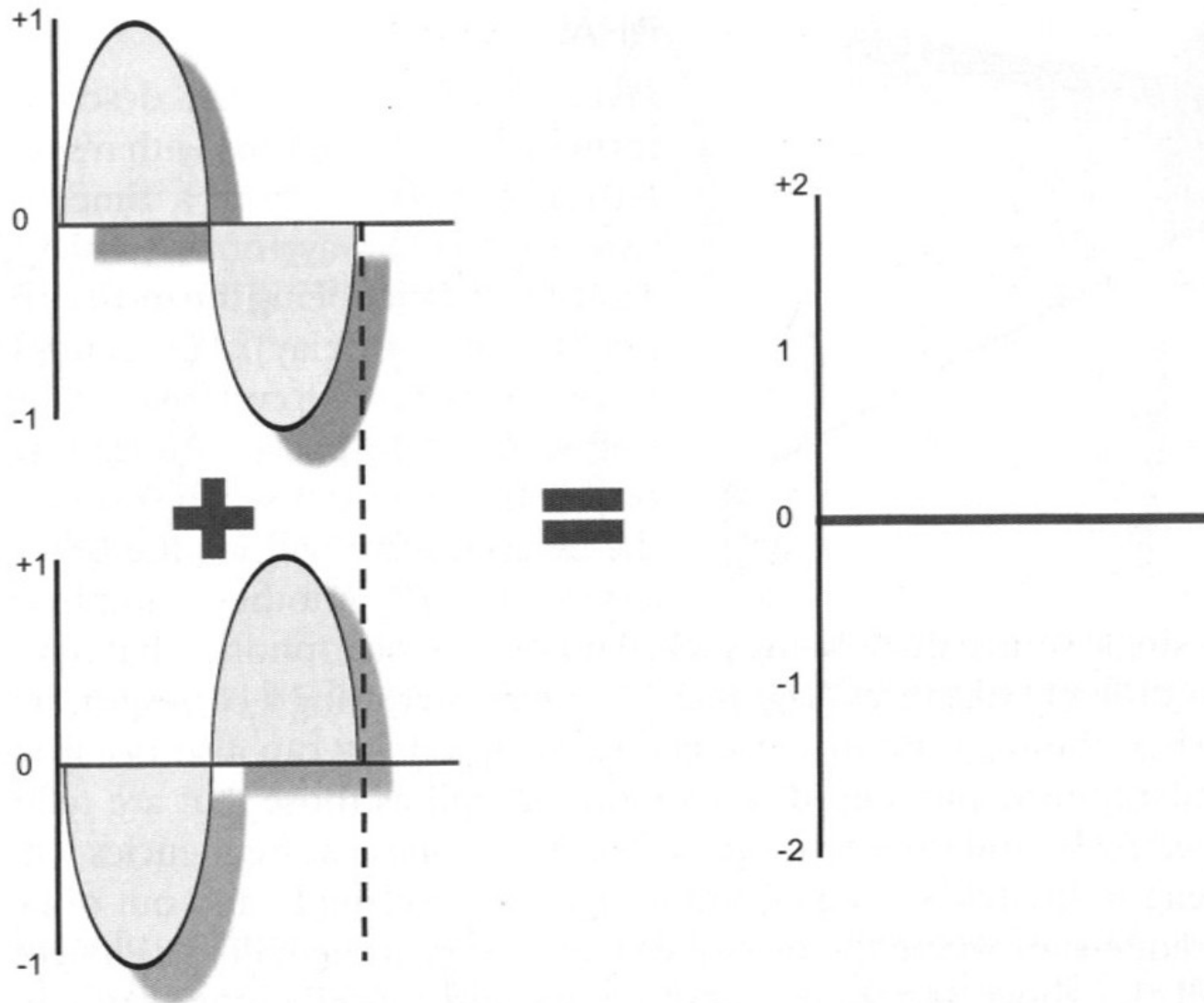
In phase = amplitudes combine

Phase



Partial phase = add in some places, subtract in others

Phase



Out of phase = amplitudes cancel

Phase Exercise

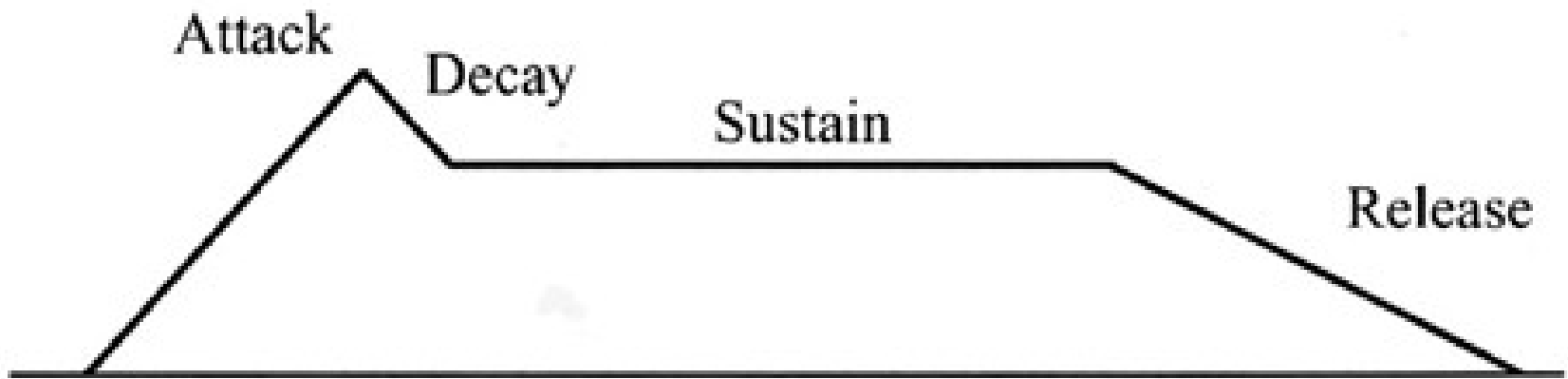
Envelope

Each sound has a life cycle: it is born, lives, and then dies.

Each sound also has a shape.

This shape is called the envelope.

Envelope



The envelope of a wave.

Envelope (ADSR)

A

Attack

D

Decay

S

Sustain

R

Release

Envelope (Attack)

Attack: sound is initially broadcast and reaches its peak loudness.

Fast = onset is very close to peak.

Examples of fast attack?

Envelope (Attack)

Slow attack = sounds that take a longer time to build to a peak, and will often have a longer decay as well.

Examples of slow attack?

Envelope (Decay)

Decay: the moment at which the sound drops from peak loudness to the more consistent amplitude of the Sustain.

Think of the Decay as the **transition** between the Peak and the Sustain.

Envelope (Sustain)

Sustain = the bulk, or body, of the sound.

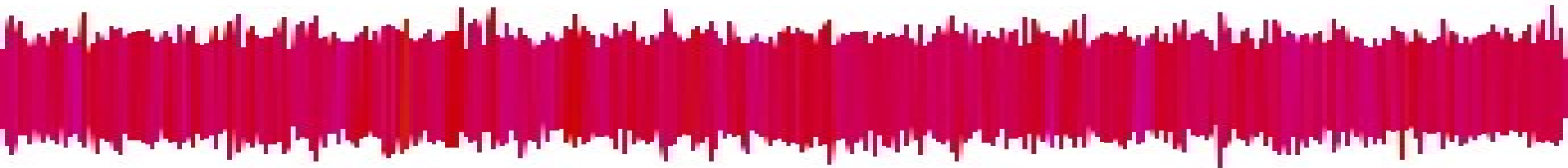
The body of the sound will maintain a consistent level of amplitude until the source sound stops vibrating.

Sustain can be extended by looping (copy/paste).

Envelope (Sustain)

Drone is a sound without attack or release, a body without head or tail.

Drones became more prevalent after the Industrial Revolution.



Envelope (Release)

Release = the decrease in amplitude when a sound source stops vibrating.

The decay time = how long it takes for a sound to descend into “silence.”

Envelope (Release)

The decay of the Release, especially if echo or reverberation are present, can tell us a lot about a sound.

A short, dry decay (lack of reverb or echo) = small, sterile room.

Long, wet decay (lots of reverb/echo) = indoor cavernous space (cathedral) or outdoor site (canyon).

Envelope (ADSR)

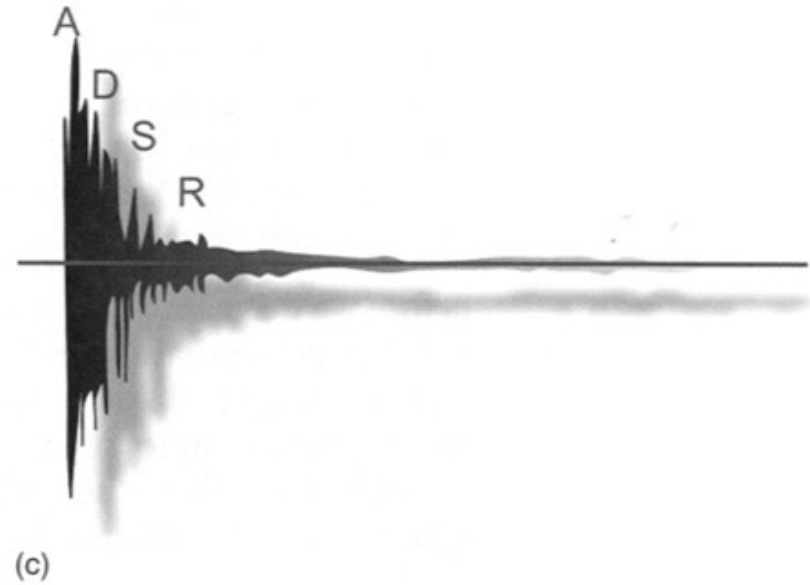
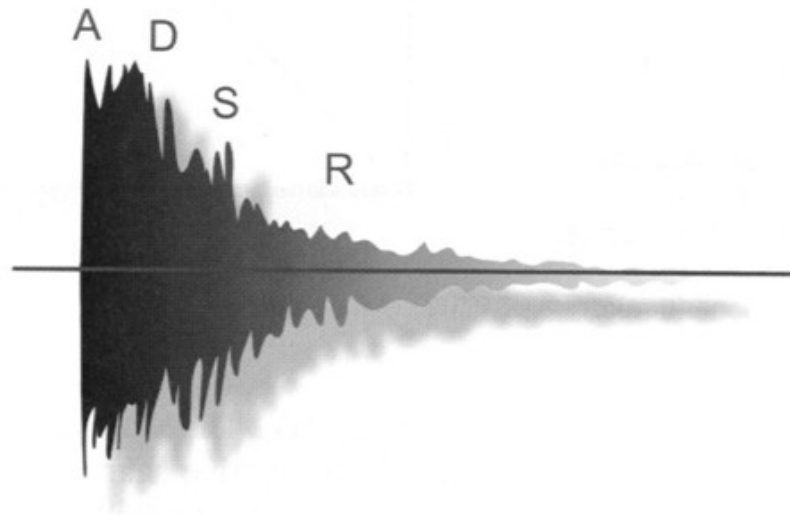
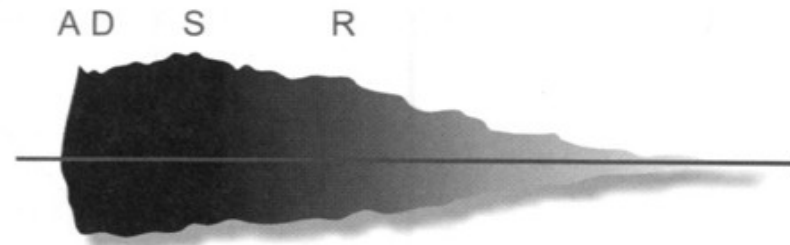


FIGURE 2.19
Various musical
waveform envelopes:
(a) trombone,
(b) cymbal crash,
and (c) snare drum,
where A = attack,
D = decay,
S = sustain, and
R = release.

Quiz 3.2

1. Name the four elements of the sound envelope.
2. TRUE or FALSE: variations in **phase** = time delay between two or more waveforms.

gbach@edmc.edu

Credits