

## Components of Bone Conduction

Outer Ear Component → Occlusion Effect

Middle Ear Component → Inertial component

Inner Ear Component → Distortional Theory

The outer ear component of bone conduction is the occlusion effect which is due to the cartilaginous portion of the ear canal. The occlusion effect occurs due to a blockage of the cartilaginous portion of the canal. When the ear canal walls vibrate, it creates a sound in the ear canal space and when the pinna is covered or the ear canal is occluded, there appears to be an improvement in bone conduction threshold which is due to trapped sound → Occlusion Effect. When the pinna is closed off, sounds reverberate off what is covering the pinna (headphone) and the sound energy adds to the energy of the sound presented by bone conduction. This is a low frequency phenomenon and can cause up to a 30dB increase at 250 Hz, 20dB increase at 500 Hz and a 10 dB increase at 1000 Hz.

The middle ear component of bone conduction is the inertial component which is due to the skull vibrations causing ossicular vibrations. In this case, the ossicles move side-to-side, not front-to-back (normally). The inertial component of bone conduction is only present when the bone vibrator is placed on the mastoid, not on the forehead placement. However, the mastoid placement is mainly used in clinic because the forehead is more sensitive.

The inner ear component of bone conduction is explained by the distortional theory. The distortional theory states that the mechanism of bone conduction is the distortional vibration of the cochlea. Since the volume of the scala vestibule is greater than the volume of the scala tympani, distortions cause displacement of the basilar membrane.