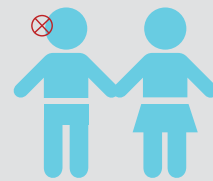


Unilateral Hearing Loss

Unilateral hearing loss (UHL), or single-sided deafness (SSD), is a type of hearing impairment where there is normal hearing in one ear and impaired hearing in the other.

It occurs when sounds cannot properly reach the working inner ear (cochlea), or when sounds reaching the inner ear cannot be turned into the neural impulses that are sent to the brain, due to inner ear damage. Typical causes for the loss of hearing include viral infection and head or ear trauma.

3%
school-age children



The percentage of children affected by unilateral sensorineural hearing loss.

Stereo Headphones

Sound signals for stereo headphones are split, thus the monaural individual can only hear half the components, e.g. the bass or piano, but not both.



60,000
new cases



The number of new cases of UHL each year in the US.

I Hear in Mono

I remember this particular day when I was young: I was lying on the floor doodling in front of my mother's desk while she was talking on the phone. As I looked up between doodles to see if she was done, I noticed something that confused me. She was talking on the phone with the receiver to her right ear.

That was the day when I found out that other people can hear with both ears.

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At age six, I was struck by a bad case of the flu, and my fever reached over 106 degrees. On my next visit to my pediatrician's, they discovered I was 100% deaf in my right ear.

1 The Noisy Room

People with two working ears are able to *beamform* sound, meaning that their brains can use the differences in intensity and timing with which sound waves hit each ear to localize its source. This enables them to tell from which direction and how far away the sound is coming. They are also able to *broadband beamform*, which allows all sound frequencies to beamform simultaneously, so that the listener can differentiate between independent signals. This process allows the binaural listener to exclude sound that is anything other than the signal of interest. Thus, in a crowded room, a binaural person can hear the person s/he is talking to, while excluding the other voices generated in the vicinity.

In contrast, a monaural person is unable to localize or beamform sound, because s/he can only hear one channel of the acoustic signal. All of the sounds from a given space are received as a single muddled input. Thus, the monaural person can barely hear a close conversation in a noisy room, distracted by the large signal of a nearby talker or the overall din of collective conversation.

3 Head Shadow Effect

When sound comes from the side of the impaired ear, it reaches the hearing ear with considerably less intensity, creating an acoustical shadow that further limits the directionality of sound.

4 Bouncing Acoustics

In a noisy, acoustically reflective environment, sound will seem to originate from all directions. Significant reverberation coming off the environment can cause added difficulty for the unilateral hearing person.

2 Spinning in Circles

Because a monaural person cannot localize sound, it is impossible for the brain to accurately interpret background noise or determine the source of a specific signal. Often, when called, a monaural person will turn 360 degrees in search of the sound source.