Don't just turn the panpot back and forth!

aka: Spatial location as a compositional and engineering consideration

by Scott A. Wyatt
University of Illinois Experimental Music Studios

One of the clear indications of an inexperienced electroacoustic composer is indiscriminate use of panning or incessant panning within a stereo recording. More novice indicators include moving a sound from left to right or vice versa when the sound does not imply any movement, or moving/panning a steady state sound or a sound primarily made up of low frequencies (you cannot locate low frequencies due to wavelength).

Here are some suggestions for more informed creativity and engineering for your compositions. Please consider depth proximity, as well as specific sound source locations within the horizontal stereo field for engineering and composition. This is much more effective than

Factors for determining a sound's distance from the observer:

The most decisive cue used for determining distance is perceived loudness; as amplitude reduces with increased distance. Secondly, low amplitude, high frequency, and low frequency partial content of a sound's composite timbre diminishes with increasing distance from the listener. Finally, a change in the ratio of the amplitude of the direct sound to the amplitude of the indirect or reflected sound (sound reflected off of objects, walls, floor and ceiling: the host space) assists in determining distance proximity.

Please consider the following for inclusion in your work:

Foreground - very close proximity
much higher amplitude
full frequency range of that particular sound
little or no reflected sound incorporated (little or no reverb)

Midground - proximity is further away
amplitude is reduced noticeably
some reduction of high (7K Hz) and low frequencies (100 Hz)
some reflected sound incorporated
(equipment used: LP and HP filters or BP filter or EQ, mixer attenuators, reverb and/or processor for reverb/delay)

Background - proximity is much further away
amplitude is reduced significantly
significant reduction of high (4K Hz and above) and low frequencies (150 to 200 Hz and below)
probably no direct sound, that is to say it should be heard as all reflected sound
(equipment used: LP and HP filters or BP filter or EQ, mixer attenuators, reverb and/or processor for reverb/delay)

Keep in mind that the direct output of any outboard reverb unit or plug-in reverb is always too bright (promoting an extremely artificial sound) and will require significant attenuation of frequencies from 5000 Hz. on up.

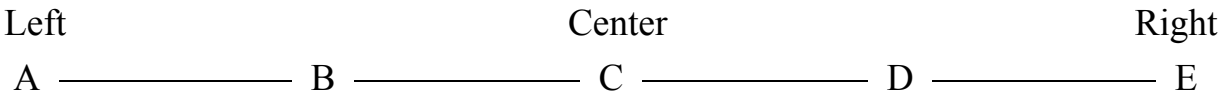
Factors for determining the lateral localization of a sound source:

For sounds whose frequencies are approximately 1000 Hz or lower, a listener's ability to identify a sound's location (left, center or right) is determined by *interaural time difference (ITD)*: time delay information indicating the amount of time it takes the sound to travel the additional distance around the head to reach the other ear. This timing difference of the initial transient as perceived by the brain allows us to determine whether the sound we are hearing is coming from the left, center or right. Interaural time difference is effective in determining sound location with frequencies whose wavelengths are larger than the size of the listener's head, thus the reason for indicating the above frequency range stipulation.

For sounds whose frequencies between 1500 to 8000 Hz the wavelengths are smaller with significantly shorter time delay in moving around the listener's head to be received by the other ear thus making the timing difference of the initial transient difficult for the brain to distinguish. For such frequencies, *interaural intensity difference (IID)* (comparison of levels of perceived loudness between the left and right ears) is used to determine lateral location of the sound source.

Since most sounds are made up of composite frequencies, the brain often uses both techniques to determine the location of a sound source.

At least five distinct linear positions from left to right within the horizontal stereo field can and should be considered:



These locations can be easily incorporated and heard for foreground and midground material. The listener's ability to detect these specific locations within background material will be dependent on the frequency content and type of articulation of that material.

The equipment necessary for engineering this would include:

- panpot on mixer, or split the signal by means of a bridge and then send 2 copies of that signal into two mixer inputs (one for L, one for R)
- LP and HP filters or BP filter or EQ, mixer attenuators, reverb and/or processor for reverb/delay)