Der Haaseffekt und die "phantasievolle" (unrichtige) Auslegung in Audio-Büchern

Der Name "Haaseffekt" geht auf die grundlegenden Untersuchungen von Helmut Haas aus dem Jahre 1951 zurück: "Über den Einfluss eines Einfach-Echos auf die Hörsamkeit von Sprache", Acustica 1, 1951, S. 49. Es ist die Bezeichnung für bestimmte Gesetzmäßigkeiten bei der Trading-Lokalisation als Auslenkwirkung eines Direktsignals (Primärsignal) im linken Lautsprecher und einer einzelnen (!) Reflexion (zeitverzögertes Sekundärsignal) im rechten Lautsprecher, die im Pegel so kompensiert (!) wird bis wieder quasi die anfängliche Centerlokalisation verbreitert erscheint. Das hat absolut nichts mit unserer Stereotechnik zu tun und Panpots kommen bei Haas überhaupt nicht vor - nur hart L und hart R.

http://www.sengpielaudio.com/WasSagtDieLiteraturZumTrading.pdf

In seinem Buch schreibt Bob Katz "Mastering Audio - the art of the science" - Seite 234 bis Seite 236:

Courtesy of Digido - Digital Domain-Mastering Audio - Bob Katz - http://www.digido.com

In diesen Text haben sich deutliche Falschaussagen zum Haas-Effekt eingeschlichen; siehe auch:

http://www.sengpielaudio.com/WasSagtDieLiteraturZumTrading.pdf

Adding Depth in Mixing and Mastering

The Haas Effect

The Haas effect can help increase definition, depth and fullness without causing masking problems. Haas says that very short echoes (less than about 5 ms) produce an ambiguous (confused) Image. However, echoes from about 10 through approximately 40 milliseconds after the direct sound become fused with the direct sound - only a loudness enhancement occurs. This is what happens in a real room with the earliest wall and floor reflections, Since the velocity of sound is approximately one foot per millisecond, 40 milliseconds corresponds to a wall that's 20 feet distant (assuming a flat wall perpendicular to the angle of the direct sound).

Haas Delays in Mixing to Enhance Spatial Qualities

In pop or classical mixing, we can use delays take advantage of a very important corollary to the Haas effect, which says that fusion (and loudness enhancement) will occur even if the closely-timed echo comes from a different direction than the original source. The brain will continue to recognize (binaurally) the location of the original sound the proper direction of the source. The Haas effect allows added delays to enhance and reinforce an original sound without confusing its directional just as long as the delay is not too long and the le of the delayed signal is not too loud. When the d is too long or the delayed signal too loud, it start be perceived as a discrete echo; which we call the Haas Breakdown point. Long delays maximize the definition of the source, as long as we have not reached breakdown. The Haas breakdown point shorter for percussive sounds; for example, sometimes only 15 ms is tolerable for a drum hi while up to 30 - 50 ms is permissible for strings.

To take advantage of the ear's own decoding power during mixing, generally use panned and leveled delays in the 12 to 40 millisecond range. Haas delays are more effective than equalization at repairing sound of a drum set which was recorded in a dead room. To create layers in the mix, put single delays on some instruments, multiple (or no) delays on others; try doubler and quadrupler delay plugins with built-in panning, supplemented with the panpots in the console. Mix engineers also use computerized early reflection simulations found in devices such as the TC Electronic, EMT, and certain models of Sony reverbs. Using a variety of techniques and processors can increase depth and space.

When mixing in surround, it is best to avoid power panning (standard panpots) between front and surround as it produces a very ambiguous image. As with stereo, think beyond the panpot. Virtual panpot positions do not image well - it is much better to use a surround early reflection generator, which produces a more stable image and allows a wider sweet spot.[4]

Haas and mono-compatibility. When utilizing simple Haas delays, be sure to check the recording in mono for comb filtering. The more complex and numerous the delays, the less likely that comb filtering will occur.

Haas In Mastering

We receive recordings for mastering which lack depth, spatiality and clarity for two reasons: 1) the mix engineer did not mix early reflections or reverberation well enough or loudly enough. 2) the recording was made in a dead room and the mix engineer either used no reverberation or cheap reverberation which does not contain adequate early reflections. In the first case, adding further artificial can muddy the sound. But ambience extraction, used subtly, can increase depth and definition. In the second case, we may suggest a remix with better reverberators. Or if the reverb used in the mix has a decent tonality but no sense of depth, we may try adding early reflections from a superb algorithm such as the TC Electronic VSS4, which can add depth to a dead room. However, the depth effect will be more convincing when the original room has some useful reflections which we can combine with the artificial ones to enhance the reality. The VSS4 has a feature called decrease which prevents generating artificial early reflections which are already present in the source.

Using Frequency Response to Simulate Depth

In a natural acoustic environment, the apparent high frequency response is reduced as the distance from a sound source increases. This provides another tool with which the recording engineer can simulate distance. An interesting experiment is to alter a treble control while playing back a good orchestral recording. Notice how the apparent front-to-back depth of the orchestra changes. We can use mikes with differing treble response, or during mixing, change the high frequency characteristics to move instruments forward or backward.

The Magic Surround

We can take advantage of the Haas effect to naturally and effectively convert an existing 2-channel recording to a surround medium. When remixing, simply place a discrete delay in the surround speakers to enhance and extract the original ambience from a previously recorded source. No artificial reverberator is needed if there is sufficient reverberation in the original source. Here's how it works:

Haas fusion only works with correlated material. The ear fuses correlated sources with their delayed replicas (e.g. a snare drum hit) and so continues to perceive the direct sound as coming from the front speakers. But this does not apply to uncorrelated ambience - because the ear does not recognize the delay as a repeat, thus spreading, enhancing, and diffusing the ambience between the location of the original sound and the location of the delay. Dolby laboratories calls this effect the magic surround, for they discovered that natural reverberation was extracted to the rear speakers when a delay was applied to them. Dolby also uses an L- minus - R matrix and logic elements to further enhance the separation. The wider the bandwidth of the surround system and the more diffuse its character, the more effective the psychoacoustic extraction of ambience to the surround speakers. My patented K-Stereo and K-Surround processes start with and extend these principles.

In Conclusion

Influence Of The Control Room Environment On Perceived Depth

At this point, many engineers may say, "I've never noticed depth in my control room!" As described in Chapter 15, the widespread practice of placing near-field monitors on the meter bridges of consoles kills almost all sense of depth.

Listening Examples

Here are some examples of stereo audiophile recordings I've made that purposely take advantage of depth and space, both foreground and background, on Chesky Records. Sara K. Hobo, Chesky JD155. Check out the percussion on track 3, "Brick House". Johnny Frigo, Debut of a Legend, Chesky JD119, especially the drums and the sax on track 9, "I Love Paris". Ana Caram, The Other Side of Jobim, Chesky JD73, particularly the percussion, cello and sax on "Correnteza". Carlos Heredia, Gypsy Flamenco, Chesky WO 136. Listen to track 1 for the sound of the background singers and handclaps. Phil Woods, Astorand Elis, Chesky JD146, for the natural-sounding combination of intimacy and depth of the jazz ensemble.

Technological Impediments to Capturing Recorded Depth

Depth is the first thing to suffer when technology is incorrectly applied. Here is a summary of some of the technical practices that when misused, or accumulated, can contribute to a boringly flat, depthless recorded picture:

- Multitrack and multimike techniques
- Small/dead recording studios or large rooms with poor acoustics/missing early reflections
- low resolution recording media
- excessive dynamic range compression (which tends to amplify the mono information and bring everything forward)
- improper use of dithering, cumulative digital processing, and low-resolution digital processing

In Summary: To resurrect the missing depth in recording, mixing and mastering, use the

highest resolution technology, best miking techniques, and room acoustics. Process dead tracks with Haas delays and early reflections, and specialized ambience recovery tools.

1 - Haas, Helmut (1951) Acustica. The original article is in German. Various English-speaking authors have written their interpretations of Haas, which you can find in any decent textbook on audio recording techniques.

2 - Even if unnatural, it can be interesting, nevertheless. Listen to 1960's-70's era rock recordings from the Beatles. Beach Boys, Lovin' Spoonful, The Supremes, Tommy James and the Shondells, where mono instruments or vocals are panned to one side, and often their reverb return completely to the other side.

3 - Burroughs, Lou (1974), Microphones: Design and Application, Sagamore Publishing Company. (Out of print). Burroughs quantified the effects of acoustic phase cancellation (comb filtering, interference) with real microphones and real rooms, and devised this rule: The distance between microphones should be three times the distance between each microphone and the source of the sound to which it is being applied. This is particularly important to avoid comb filtering when both microphones are feeding a single channel: when the microphones are feeding different channels (e.g. stereo), the degradation will be much less noticeable in stereo but still be a problem in mono.

4. - http://www.digido.com links to further articles on this topic.