Subject: Re: Favorite flavors
Posted by Earl Geddes on Mon, 24 Jan 2005 17:38:04 GMT
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Waynes response is fine but I have some things to add.Reflections - good or bad? - depends on a lot of factors.First is the time of arrival of a reflection. This is because of the integration time of the ear. Refelections less than 10 ms are integrated with the direct sound (first arrivalk) to form a single impression in the brain. For lateral reflections, these delayed signals cause everthing from coloration to a muddyness in the sound and a loss of image focus or transperency. All these things are basically subjective terms for the same thing. Since our ears are lateral they react to lateral reflections differently than vertical ones. Vertical reflection can only cause coloration, not image shifts since they arrive at both ears at the same time. But they have strong coloration problems.In the region between 10 and 20 ms. the ear is begining to desensitize to the reflection as a problem. And this too is frequency dependent. The ear is not at all sensitive to image shifts for LF reflections and only marginally sensitive to coloration efects at LF. So refections are primarily a mid to HF issue. We don't localize on LF's. Above 20 ms, reflections are perceived as a seperate auditory events which we subjectively call reverberation. If these reflections are difuse - arrive from many directions - then they create a sensory effect know as spatiousness - a very good thing almost critical in a small room.There is one other consideration, an that is if the early refections arrive at the same ear as the direct sound or the opposite one. In other words a refcetion from the right for the speaker on the right is far worse than a reflection from the left for the speaker on the right.So in a nut shell - we don't want ANY early refections, but we want as many later refections as we can get. If there must be some early refections, i.e. the room is small, then these should be adjusted to be from the opposite wall not the near wall. This is the crux of the room acoustics problem.The normal small room solution is to put sound damping everywhere. This may help reduce the early reflections, but it simply kills the later reflections and so there is no spatiousness to the room at all. The direct field versus reverberant field situation cannot be cured with room treatmnet alone. SOmething must be done in the loudspeakers themselves to help to control this problem.Now (and this is a part where I may disagree with Wayne, but he may have also mistated his point) the ear perceives both the direct (sometimes called axial, but only if one is actually on axis) and the rverberant field. Wayne stated ("On-axis, this loudspeker may sound just fine.") which I think would be better said as "This speakers will sound best on-axis". But I would contend that there will still be a perceived problem with the sound since the reverberant field is not flat. This speaker would only sound "fine" only in a reflection free environment, but then it would also sound dead - no spatiousness at all. Some contend that we get "spatiousness" from the recording, but this is not true. Why? because the reverberation in the recording is not difuse - it does not arrive at the ear from different directions. This is what multi-channel sound is trying to create - a more diffuse reverberant sound field from a recording. But the CORRECT way to get spatiuosness is with proper room acoustics. A non-flat reverberant field will always color the sound but in a different way than an early reflection. I don't think that Wayne and I disagee, but we might say things differently.Finally, and this is a aspect that is seldom appreciated and that is: the higher the directivity of the source in a small room, the slower will be the build up of the reverberant field. You have to think about this a bit to see why. An omni directional source has a reverberant field that builds almost immediately because it has a flurry of very early reflections off of all nearby walls etc. A narrow directivity source has fewer early reflections and it takes a much longer time for the sound field to build into reverberation. This slower rise time of the reverbeant field is subjectively very important because it allows time for the ear to process the direct field

unencumbered by the reverberant field.These are all immensely complex factors when one takes the ear into account, because, quite frankly, the ear is immensly complicated. It is nonlinear in frequency, time and level - it couldn't be any more complicated. In fact it even works differently at LF and HF with a continuous blend in between.Designing good audio requires a design that works best with the ear. These designs are inherently more complicated, but inherently better sounding. On this point both Watne and I agree. We are still having some disputes on the finer points however.