7.5 PROFESSIONAL LISTENING VS. RECREATIONAL LISTENING

Go into almost any recording control room and there is a high probability that early lateral reflections have been eliminated or attenuated by appropriately angled reflecting surfaces or massive absorbers, or both. It seems that recording engineers want to be in a predominantly direct sound field, as I found when I designed my first studios in the 1970s. Reflected sound had become unacceptable in the context of mixing recordings. This led to the "reflection-free zone" concept (D'Antonio and Konnert, 1984), the "live-end-dead-end" (LEDE) style of control room (Davis and Davis, 1980), and countless variations on those themes, including the extreme "non-environment" room, in which virtually all boundary reflections have been substantially attenuated (explained in Newell, 2003).

Having followed this for decades, it is clear that fashion and folklore play roles in this situation. Some of this has become "hand-me-down" acoustical theory, with some misinterpretations of psychoacoustics propping it up. If there is merit to the approach, it should be possible to demonstrate it in a way that does not deteriorate to a strongly asserted personal opinion.

I have not done an exhaustive search of the literature, but it has not been difficult to find several thoughtful investigations of what might be optimum listening and working conditions with respect to early reflections. One of these was shown in Section 7.4.1, where professional listeners opined that for recreational listening some lateral reflections were advantageous, but for examining audio products it was better to attenuate them. Kuhl and Plantz (1978) looked into the directional properties of loudspeakers that would be most suitable for (stereo) control room monitoring. Using only professional sound engineers as listeners, they found that narrow-dispersion loudspeakers were required for good reproduction of voices in radio dramas; dance and popular music was also desirably "aggressive" with "highly directed" loudspeakers. The majority of these same listeners, however, preferred wide-dispersion loudspeakers for the reproduction of symphonic music at home. In the control room, though, only about half of them felt that they could produce recordings with wide-dispersion loudspeakers. So, most of these professionals liked room reflections for recreational listening and about half of them thought that they could mix with wide-dispersion loudspeakers and the lateral reflections that resulted from them. Clearly there are individual differences.

Voelker (1985) had 90 people with varied professional audio backgrounds evaluate a control room that was set up to be (a) relatively reflective, (b) live-end, dead-end and (c) all surfaces damped. He concluded that the reverberant control room was preferred for chamber music and church organ. The LEDE™ room received the most votes for drum solo and disco music, followed by the non-reverberant room. It is concluded that a compromise is necessary in the acoustic design of control rooms when they are to be used with many types of music. This compromise is found in many existing control rooms where short-term (early) reflections from windows, doors, equipment and other furnishings give rise to a sense of reverberance.

Augspurger (1990), a well-known designer of loudspeakers, recording and listening rooms examined the similarities and differences between control rooms and home listening rooms. As noted earlier, he was very aware of the 2 kHz acoustical crosstalk dip in the phantom center image—a characteristic of all stereo systems. Control rooms are configured so that "the recording engineer hears roughly equal parts of direct sound and generally reflected sound at midrange frequencies." In his home stereo experiments he concluded that he preferred "hard, untreated wall surfaces. To my ears the more spacious stereo image more than offset the negative side effects. Other listeners, including many recording engineers, would have preferred the flatter, more tightly focused sound picture." As he says, "any study of real world stereo reproduction involves a strong element of subjective bias."

David Moulton (2003, 2011), an experienced recording engineer and educator in the field, has thought and written about the matter of monitoring rooms and loudspeakers for years. He and his recording engineer colleague LaCarrubba (1999) concluded that loudspeakers should have flat and very wide uniform horizontal dispersion over the front hemisphere combined with control-room acoustical treatment that would leave early lateral reflections intact, while attenuating later reflected sound. He collaborated in the design of a high-end consumer loudspeaker, the B&O Beolab 5, aspiring to those requirements. According to this approach the same enriched early-reflection sound field would exist both at the creation of recordings and their playback.

The Producers' and Engineers' Wing of the National Academy of Recording Arts and Sciences, an assembly of prominent sound recording professionals, produced a report, "Recommendations for Surround Sound Production" (NARAS, 2004). In it, they recommend, for acoustical treatment, "To as great a degree as possible, early reflections should be suppressed." "In addition there should be as much diffusion as a budget will allow." "To summarize: the more uniform (diffuse) the ambience in the professional mixing environment, the more site-independent the resultant mixes will be." There is a fundamental contradiction in this recommendation: suppressing the early reflections also suppresses the ones that would have followed them, and therefore the diffusion of the sound field is impeded before it has a chance to develop (see Figure 10.4). If the early reflections are indeed absorbed, any "diffuse" sound field would be from areas illuminated by later reflections and would be at a low sound level. There was no reference to any research supporting this approach.

Inspired by comments in the earlier edition of this book relating to the relative importance of the direct and early reflected sound, and the seeming ability of listeners to adapt to reflections in a room, researchers in the graduate program in sound recording, Schulich School of Music, McGill University, embarked on an elaborate investigation (King et al., 2012). "The study focused specifically on the working audio professional and the audio production environment." It evaluated changes in mix settings when laterally reflected sound was altered by surfaces that were reflecting, absorbing or diffusing. The tests were blind, and the 26 subjects were professional recording and mixing engineers with over 10 years of musical training, and an average of approximately 10 years of production experience. As it was set up, the dominant acoustical reflections

were from the test surface opposite to the active loudspeaker, which is different from the majority of tests that involved first reflections from the adjacent boundary. The fundamental result was that "no significant main effect was found for acoustical treatment." When asked which acoustical treatment created the best listening condition for mixing, 8 subjects voted for diffusion, 7 for absorption, and 11 for reflection. From this it would seem that these professionals quickly adapted to each of the lateral sound conditions and simply got on with the job. More studies of this kind would be worthwhile, employing more aggressive differences in the reflected sound field.

In 2014, Tervq et al. tested the preferences of 15 sound engineers who listened in nine different environments. They found that the preference depended on the task of the engineer, mixing or mastering, and on the specific song. In general it was found that mixing engineers preferred the clarity provided by a lack of reflections, while mastering engineers preferred more reverberant environments. The latter is probably good in that it is closer to how customers listen. Again, they found evidence of significant adaptability.

So, if we are looking to professional sound engineers for guidance in loudspeakers and acoustical treatment, we find that they are not all in agreement—except, perhaps, about what they prefer to listen to when they relax.

7.5.1 Hearing Loss Is a Major Concern

If the ears are not functioning normally, what we hear is not normal. Aspects of hearing that are important to our appreciation of music, movies and life in general are not evaluated by conventional audiometric examinations. Chapter 17 explores some of the details and, frankly, it is a discouraging picture. This is a topic that every person needs to be informed about at an early age so that the necessary precautions can be taken to preserve this essential ability. In the present context, the summary information seems to be that those with temporarily or permanently deteriorated hearing not only hear less sound, but they are able to extract less information from sounds that they hear. The natural instinct is to reduce the complexity of the listening situation: that is, eliminate reflections. In the audio industry hearing performance is a factor that is not controlled, yet it undoubtedly contributes to differences in opinions.

7.5.2 Discussion

It is not surprising that audio professionals and audio enthusiasts have differing opinions about what an optimum combination of loudspeakers and room may be. In both cases they cover almost the entire range of possibilities. Numerous arguments exist that delayed sounds degrade sound quality, imaging, soundstage, clarity, speech intelligibility and so on. For some people this is true. But, for others it is not.

There is evidence that some professionals are able to mix in a variety of different acoustical circumstances, indicating that adaptation is possible. As pointed out in Section 7.1.1, a dominant direct sound field is where the acoustical crosstalk dip in the phantom center image is most audible. Some control rooms put diffusers on the wall behind the mix position, adding uncorrelated sound that would somewhat alleviate the

problem. It obviously should not be taken to the extreme of the example given in Section 7.3.2, where excessive use of diffusers degraded the center image. However, if a recording engineer is in a situation where the interference dip is audible, it may be motivation to add some uncorrelated, delayed sound to the stereo mix itself, thereby lessening the problem for everybody (e.g., Vickers, 2009).

Missing entirely is any proof that the personal comfort of the mixer yields recordings that are audibly superior when auditioned by the customer who, like many professionals at home, will be listening in significantly reflective sound fields. There are tales of how well some mixes "translate" better from some studios to other venues. That is a good thing. However, having heard some of those "translations" it seems that a "literal" one was not always a requirement. True, the musical message may get through, but the timbral essence may not.

Delayed sounds are an essential part of live music performances. Without them they become timbrally and spatially deprived. The irony in this is that, for the most part, the recordings that are being constructed are two-channel stereo—itself a directionally and spatially deprived format.

Some promoters of acoustical materials are vociferous in their assertion that because many professionals listen in a certain fashion, that all serious playback facilities, even home listening rooms, should follow the lead of the pros. However, people listening for pleasure, even professionals, have shown a preference for some amount of room-reflected sound. As I stated at the end of the earlier edition of this book, the treatment of early reflection boundary areas is "optional": reflect, diffuse or absorb, as the customer prefers.

I recall my very early experiments at the National Research Council of Canada (NRCC), where in exploring the basics of perception I installed heavy sound-absorbing drapes on a track extending down the side walls and behind the loudspeakers. In uncontrolled experiments with audiophile friends, we decided that absorbing side wall reflections seemed to flatter some recordings (mostly pop/rock) while leaving the walls reflective flattered others (mostly classical and jazz). One of them actually set up a similar arrangement in his home and used it as a "spatial" control.

Conclusion: one size does not fit all. Personal taste, music and the reason for listening are all significant variables. And, deteriorated hearing, in its many forms, does none of us any favors; it makes us distinctive in ways that we may never know.

7.6 PERCEPTUAL EFFECTS OF ROOM REFLECTIONS

7.6.1 Adaptation and Perceptual Streaming

Benade (1984) sums up the situation:

> The physicist says that the signal path in a music room is the cause of great confusion, whereas the musician and his audience find that without the room, only music of the most elementary sort is possible! Clearly we have a paradox to resolve as we look for the features of the musical sound that gives it sufficient robustness to survive its strenuous voyage to its listeners and as we seek