Making yourself heard

The acoustics of crowded spaces.

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THE NATURE OF ACOUSTICAL problems in venues has been pretty much the same since our ancestors first sat in groups in a room, having a chat. There are various forms of noise that can interfere with the conversation, and the sources of noise, as well as the way to reduce them are quite basic and consistent. What has changed in recent times, however, is the introduction of amplified music into the equation. Whether it's a PA system in a pub or club, or a background music system in a restaurant or cafe, these sources are now found in most venues. In itself, the addition of amplified music is no real problem, but the perceived importance of it, and its assumed central role in the venue can be.

I go to many venues as an acoustical consultant where the proprietor has a problem with noise. It's very often the same problem and gets described as the venue getting to a certain level of occupancy, after which no one can hear themselves or their friends talk, waiting staff can't hear patrons to take orders or that all of a sudden it gets uncomfortably loud. Very often the client is angry or confused because the company that supplied the PA or background music system told them it was 'highly directional', 'especially made for such venues', adjustable via touch panel to suit different times and occupancies, doesn't require the room to be acoustically treated, etc.

The problem here is that such importance and marketing hype is built around the amplified music system, that in the owners' eyes, is also about the acoustics. The conversation becomes dominated by the PA and the owner is not savvy enough (understandably) to realise that room acoustics is a separate issue. The marketing and excitement about PA systems is all well and good in the sense that there are many brands with some very clever new technologies, all competing for a slice of the market. In the end this should help the customer get better value for money when buying one. The aspect that gets forgotten though, is what happens when the PA or background music is turned *off*? It can't possibly, no matter how high-tech and clever it is, take care of the room acoustics and deal with the noise problems that will arise when a number of small groups of people all talk at the same time. Of course, it is even worse when the music is on and the customers are talking. So, in essence, we are talking about a room acoustics problem that has been overlooked because other things seemed more important.

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The good news is that fixing the problem is often not that difficult and rarely gets more difficult because of the PA or background music. It is a problem of reverberation time (RT60) within the room and its effect on multiple noise sources. Here's the setup we're all familiar with: people talk louder to be heard over the background noise, which in turn raises the background noise for everyone else, so they speak louder (all the while the venue ramps up the sound system to compensate) and on it goes until a roaring din makes it an unpleasant place to be. As I say, we have all been in this situation and know how hard it is to converse with those around you, let alone be heard over the bar or appreciate any music that may be playing.

Occasionally, you experience a venue where it's easy to talk, but sadly they seem to be very much in the minority, whereas they really should be the norm – after all, they're a more comfortable and enjoyable place to socialise in.

So what's the answer? Technically, the solution is to use acoustic treatment to make the reverberation time of the room suitable for the intended purpose, and reduce or remove problematic reflections. In practice this means doing a few things: (1) Using absorptive materials to get the RT60 to a suitable value, (2) Reducing the amount of parallel surfaces by angling walls or using ornamental features, and (3) ensuring wherever possible there is no single large acoustic reflector, like a big, flat, uncovered pane of glass.

The first item, absorption, is not too difficult as there are a wide range of suitable materials. They range from carpet and curtains, through furnishings to purpose made acoustic panels (for a more detailed description see 'Acoustic Absorption' in Issue 2). The point to remember is that thinner materials only absorb higher frequencies and using too much of them (like carpet and curtains) can leave a room sounding dead and muddy.

Make sure absorption is applied in a balanced way, to take care of middle and lower frequencies as well. This will often mean using some acoustic panels, but they can be coloured or covered in such a way they become disguised or used as a feature. It is worth engaging an acoustic engineer to determine the correct balance and amount of absorption. This can be done by calculation, measurement on site or most commonly a mixture of both.

STAYING OFF THE STRAIGHT & NARROW

The second point is really about preventing reflections that can bounce or 'flutter' between parallel surfaces. Obviously reducing the number of parallel surfaces will help rather a lot in this regard. Walls can be angled so that they are non parallel or they can be staggered to break up flutter echoes.

Alternatively, ornamental objects can be used. Convex curves in the right dimensions work very well. Even rectangular columns can work if placed correctly. This is also a design task where having an acoustic engineer work with the architect or interior designer will yield big rewards. It is so much easier to get this right from the outset.

Lastly, big flat walls and panes of glass may look great in the right room, but they contribute to the noise problem. They are essentially like a great big sound reflector, and can cause a problem when a reflection is heard by a person after a certain time interval. It simply confuses the listener and, again, makes speech difficult. The instinctive thing to do is speak louder to overcome the perceived speech difficulty. Solving this is not always so simple with the glass, although some see-through blinds can help. Large flat walls can remain that way but be covered entirely in acoustic materials to preserve the look and eliminate the acoustic reflection problem.

Taking care of the acoustics in a venue is actually a very high-value activity. If the shape and construction of the internal surfaces are designed correctly, they can have a big positive effect on the acoustics and make minimal difference to the cost of construction (as most of it is just slight rearrangements). The same goes for furnishings like carpets, curtains, blinds etc. If they are considered in the overall design by an acoustic engineer, they're almost at no extra cost, just the right choices.

This leaves only specific acoustic treatment to be added to the mix and much of that is inexpensive as well. Plain acoustic panels generally cost about $175 per square metre. More elaborate fabrics or even photographically printed ones are available but of course they get more expensive. Systems are available for stretching and tensioning fabric over entire walls to maintain a flat, simple finish while covering all the acoustic treatment behind.

The really big benefit to all of this goes way beyond solving the problem of escalating noise and making it a pleasant environment. It is actually the reverse of where this discussion began – the PA system or background music will sound fantastic and everyone will be able to enjoy it, rather than fighting against it. So, to summarise, yes PA systems and background music are high-visibility, exciting components and acoustic treatments are not but... acoustic treatments are the key to all of the noise problems in a venue because those issues, as they always have been, are dependent on the acoustics of the room, whether there is amplified music in there or not. ✔