ON TONAL BLOOM

by Ervin Somogyi

There is an element of guitar sound that is called “tonal bloom”. This is the phenomenon in which, when one strums a chord on a guitar (in an otherwise quiet room) and the sound comes out of the soundbox, then within a half second or a second <u>the sound gets louder</u>. It literally wells up out of the soundbox and becomes fuller, without the player having done anything other than his initial strum. Not all guitars can do this. Typically, a guitar’s sound emerges pretty much at some maximal loudness consistent with how vigorously the strings have been strummed – like racehorses that come out of the starting gate at pretty much full speed from the get-go. The main difference between race horses and guitars in this regard is that while a guitar’s sound comes out at full initial volume it dies off over the next few seconds; the horses strive to maintain top speed without slowing down or stopping, until the finish line. But “tonal bloom” is different: the sound gets louder *all by itself*, as though one had adjusted the volume knob. It’s quite a surprising and even dramatic thing for a guitar to do.

I noticed some time ago that my guitars have a capacity for tonal blooming. I noticed it mostly because I do a lot of listening (and I have, parenthetically, written an article about the ins and outs of listening; I’m going to repeat some of that information below). The thing is, it took me a long time to teach myself how to listen and what to listen for, and part of what I learned is how most of us have never learned to listen to sounds for their own sake or for the information that raw sound contains: we’ve instead been taught to pay attention to cognitive verbal information. In any event, I teach these listening skills in my annual guitar-voicing classes. I devote a long morning in each of them, to learning how to listen to a guitar and what to listen for. How else would anyone ever know how to assess whether a new guitar is in any way better than a previous one, or if a particular guitar in the music store is better than its neighbor on the wall? It is for this learning experience, and the analysis and comparisons that are involved, that I ask of each student that he or she bring a guitar of his or her own making to the class, and that we will be taking a close look at. These listening-and-analyzing sessions also include a guitar of my own, by the way, and these comparing sessions become opportunities for some very useful learning experiences to occur. The whole point of them is to enable my students to pay close attention to a guitar’s *trajectory of sound*: that is, how the sound emerges out of any guitar, what kind of sound it is, and the shape of the envelope of tonal rise-and-decay.

Let me tell you a bit about how I organize my listening sessions. First of all, they take place in a large conference room: that gives the guitars a chance to “sing”. I’m lucky in that my shop is right next to a library that has a conference room available for community meetings and gatherings, exhibitions, private events, etc. and I sign up for it every time I teach my class. My students and I take our [usually five to eight] guitars with us into that room, tune them, set them up on guitar stands, and then spend about two hours listening to them systematically . . . in pairs. I have the students sit facing away from me, halfway across the room (I *don’t* want them to see which guitar they’re listening to, and I want them to be sitting at more or less the same distance from the guitar), as I play a musical chord on two of the brought instruments. This works as follows: I assign each guitar a number and I announce which aspect of tone I want to focus on; and I tell them which “numbers” I’m playing (for example: “#1 and #3”). I play a chord three times on guitar “A”, each time allowing it to decay into silence. Then I play the same chord three times on guitar “B”, again allowing it to decay into silence each time. Then I repeat the same on guitar “A” a second time, and likewise on guitar “B”. Each pairing consists of two guitars being played twice each . . . with very short pauses between guitars.

A chord carries a surprising amount of information; it is, after all, the voice of the guitar using all six strings; and in these listening sessions we become aware of just how rich that voice is. We can get a reliable sense of bass, treble, balance, warmth, projection, in-tune-ness or not in-tune-ness, overall quality of sound (i.e. whether it’s brittle, thin, harsh, sweet, full, mellow, etc.), whether the sound is colored by overtones or tends to be fundamental, and, finally sustain. As an example, it usually comes as a surprise to learn that some guitars have a sustain of 8 seconds from strum to silence, while other guitars that look very similar can hum along for almost fifteen seconds. I leave short pauses between chords to allow the ear to relax; and the repetition of the chords on both guitars allows for better, more thoughtful comparisons.

Then, I play repeat this routine in the same way, on two different guitars. I repeat these exercises with every possible combination of two guitars . . . until we’ve heard all of them. I repeat: we are listening for a single particular aspect of tone. And if anyone wants to have another listen comparing guitar “X” with guitar “Y”, we take the time to do that.

Then, we repeat the entire cycle, listening for a different aspect of tone. We have a cycle for (1) bass, (2) for treble, (3) for sustain, (4) for balance, and (5) for volume. I have everybody make silent comparisons (we have open discussions afterwards, but not during) and take notes. The students have clipboards and take notes. Eventually, out of all the listenings and note-taking, some of the guitars invariably float to the top as being judged "better" than the others, and some are pretty much agreed to have lots of room for improvement. None of this is personal, by the way: it's simply a field trip through sound. Finally, after we have arrived at our opinions, we take a close look at the guitars themselves to see what features of construction might correlate with our heard impressions. And we discuss. All in all, having access to that conference room is *amazingly* helpful.

It was in these listening tests that I first noticed that my guitars have a voice that exhibits "tonal bloom", and that very few other guitars do. I didn't quite know what to make of this finding for a long time, but I kept on noticing it every time I have had an opportunity to strum on several guitars. And so did some of my students.

Then, last year, a friend called my attention to an interesting YouTube clip that showed a really cool experiment. Someone had filmed what happens when you set a number of metronomes into motion discordantly: that is, metronomes that are set to the same speed but wildly out of sync with each other. The sight of a number of metronomes clicking away quite chaotically, almost like school kids frantically trying to get their teacher's attention, or perhaps like a bunch of baby birds clacking away frantically asking to be fed, is a bit of a giggle – but there was a serious point to this: after a few minutes *the metronomes all adjusted their beats so as to move in perfect lockstep with each other!* – just like those AMAZING SYNCHRONIZED PERFORMERS who entertained the world in the opening ceremonies of the Beijing Olympics. There are a number of YouTube clips of the metronome phenomenon on the Internet, but three of the ones I most like are:

http://www.youtube.com/watch?v=ADGmBtLJ6y4

http://www.youtube.com/watch?v=DD7DyF6dUk

http://io9.com/5947112/watch-32-discordant-metronomes-achieve-synchrony-in-a-matter-of-minutes [*NOTE: this one seems to appear in several versions, one of which seems to have been doctored and is a bit hokey. Try to find the good version*.]

The metronome phenomenon is not magic: it's physics. The mechanism behind it is this: if you place any number of out-of-synch metronomes on a platform that is solid and that absorbs and nullifies the energy of the metronomes' vibrations, then these continue to beat out of synchronicity forever. But if you place them on a platform that isn't rock-solid, that jiggles a little bit to their vibrations, and that *allows the metronomes to share their vibrations with their neighbors* (*and thus have an impact on them)*, then these eventually modulate each other and soon end up moving in perfect lockstep. If this were looked at from an interpersonal rather than a mechanical point of view, it would sound rather like an idealized version of what happens to couples when they are in effective couples therapy: they are able to take on one another's energy and work in synch.

Anyway, I had a sudden insight about tonal bloom. I understood that this "lining up of functional or vibrating elements" that is demonstrated in the behaviors of these metronomes is also what happens in a guitar. That is, provided that – like the energy-receptive platform that the interactive metronomes rest on – that guitar's parts and components are lightly enough constructed so that they *can* respond to, and with, one another. In other words, tonal bloom occurs when the guitar's various quadrants and sections have the ability to "get in line" with each other's vibrational motions and work as a team. It is this "lining up" that takes up to a second (think of soldiers or school kids being told to form a line, and you have the idea).

Now, one might ask: so what? What's so great about a guitar that shows this time-lag tonal bloom, anyway? The thing about the metronomes is really cool, but . . . how is this a benefit, or even desirable, in a guitar? These are not bad questions.

My answer is this: in the average (and by my standards overbuilt) guitar which is deficient in such *accommodating capacity*, each part and section of such an instrument will, when activated, simply be "doing its thing" (as set by the mechanical realities wood thickness, bracing, etc.) – and, like a wind-up toy, that thing only – every time one strums a chord or plays a note. In a way, such a sound is a bit like a cake that is always made to the same recipe and with the same ingredients; there are no surprises and every slice, section, and layer of such a cake tastes like every other slice, section, and layer. In the typical guitar, some of its vibrating sub-sections might be a bit out of wave-phase with each other, and they stay that way and offer no surprises. Personally, I think that such a degree of built-in rigidity will, to some degree, keep the instrument from functioning at full efficiency or capacity. This brings us to an interesting question, because mention of “efficiency” or “capacity” leads most people to automatically think “volume” (*well*, you say, *the soundbox is really about energy management, budgeting, and maximal use, is it not*?)   But I don’t mean only volume, even though that is an entirely worthy goal to strive for in guitar making. I can agree that a given guitar that is more sturdily constructed than my guitars are might produce more volume. But basic loudness is only a part of a guitar’s potential job description. The other part is having *depth and flexibility of tone*. These are about what the soundbox can do all by itself, and also what it can do as a direct result of how it is played, insofar as how yummy, dense, varied, and rich that guitar’s sound can actually be. To return to the example of a cake all of which tastes the same, try to imagine a cake whose flavors change depending on the manner in which it is sliced up and served.

Tonal depth and *flexibility* are topics for a future article – as is the separate issue of tonal *evenness/balance*. But for the time being, I just wanted to introduce you to the concept of tonal bloom.