A PLAN FOR UNDERSTANDING VIOLIN TONE

Strategy

I've heard it said that humans don't have any memory for sound. This may be the easy out for those who can't hear and think that you shouldn't be able to, either, but I don't believe that it's really true. The trick to remembering tone is to develop a strategy to support your memory of tone, and to train your memory by experience. I'd like to outline below the way I do it.

First, an analogy. Imagine setting up a synthesizer. It's got all sorts of knobs and adjustments for every facet of tonality that you can imagine, and a lot that you never conceived of. How on earth can the player call up those sounds with all of those knobs to worry about? The answer is simple, of course: he (or the machine, or the software) remembers the settings that make the effect. Trigger the violin voice, by tweaking the knobs or calling up a preset, and all the appropriate settings switch to those that make the violin sound come out, reliably identical every time.

Now, think of this in reverse. What if you heard the sound, and could work your way down a checklist of tonal items on one to ten scales—using mental knobs, so to speak? You've separated the sound into a list of degrees of various recognizable parameters. Tomorrow, in your mind, you want to build that sound, or if you're thinking of the playing side, the specific behavior, so you look at the list and build, in your mind, the sound and tactile feeling those parameters indicate, just as the synthesizer does.

You have a violin you were working on. Several weeks ago you did an inventory like the one above, and now it's back together, so you do the inventory again. Are the results the same or different? If you are skilled, consistent, and experienced with your checklist (all of which take practice, of course, like any other skill), you'll be able to build the old sound in your mind from the checklist, and measure it against the current checklist and sound, and know what's changed.

This doesn't really sound all that esoteric, right?

Scaling

Some of these things are really simple, some more difficult. For instance, take response. Imagine a violin on which you can bow the open G string with the side of the hair ribbon, at the tip of the bow, with no pressure at all, as slowly as you can possibly move the bow, and still get a full, clear voice. That's a 1. Now imagine a violin where even when you start with a firm solid stroke at the frog at a decent volume, notes won't start well. Often you'll see cellists starting a passage on the C string by flicking the string with a finger on their left hand at the same time they hit with the bow. That's the opposite of response, and that's a 10. Divide up the distance between those two situations, and you have the scale of response. Most violins at their best, on my scale come in at around a 2 or 3, and that's the place that most good violinists will call it not perfect, but “something I can deal with”.

They'd love a 1 for response, but as you mess with response at that end, something compresses at the other end, the measure of how much force a note will take before it breaks up and distorts. Great violins will perform well at either end of the pressure/force scale, a clear note with a light bow, and a clear one with a heavy bow. Lesser instruments start losing at one end as they gain at the other, and can't be perfect at the two extremes simultaneously. Some instruments are so good that the solution is simply for the player to learn to bow within the demands of the instrument. This probably won't affect total available volume, anyway: most good violins will put out about the same amount of sound before the tone breaks, so it's just a matter of learning the violin's limits at the high end. Generally, thin instruments are worse with regard to range than thicker ones, and more likely to be responsive at the soft end, but if not well executed thicker ones can have trouble getting moving at the soft end.

So make a scale for the other end: how good the note is relative to what percentage of his power the violinist is using. If he gets a perfect sound with all the pressure he can bring to the job, that's good, and gets a high rating. My personal rating scale switches directions according to what's being measured. Since this is a measure of force, I'd give a good violin a 10, for good behavior with 100% of the player's full force.

Now you have bookends for force; what happens with no force, and what happens with infinite force. That pretty much sums up response in three easy to measure parameters: low pressure, high pressure, and range.

Anyway, that's the concept of how to build this system. Make a similar range of parameters for everything that you can hear. Make the range span from the best you could possibly imagine in your mind to as bad as you've ever seen on any violin. Every violin will, logically, fit in there somewhere.

None of this is about causes and solutions. Before you can fix something, you have to be able to recognize it, first, and second, you have to be able to evaluate how big of a problem it really is. For instance, on response, many soloists, who play against a full orchestra, response at the soft end really isn't an issue because they will never play there, but the problem of a violin choking under pressure is a deadly one.

Some of the parameters you'll be able to give distinctive names to and everyone knows about them, some you'll have to come up with your own nicknames because they don't lend themselves to really common description. It won't take a whole lot of them to build a whole violin sound. Some will have really narrow scales, like good/bad rather than 1 through 10. An example of that for me is how many notes start with a bad, squawky attack in a normal passage length. It should be, simply, zero. More than that is bad, and a problem that needs sorting out. It can be the violin, but it also can be a player with really rotten technique (I hear this a lot in recorded country fiddle music to the point where I don't listen to much of that anymore because the bad attacks are all I can hear), and you need to at least know that the violin is capable of playing cleanly when someone who knows how to play is doing it.

Parameters

These are some of the things I keep track of, in no particular order. I'm sure you can come up with more of them as you develop your own system.

Smoothness and unpleasant harmonics

The sound of a violin needs some texture, but most people find fine-grained texture (a grainy or granular sound) offensive, where slight random and irregular variations over longer periods of time make the sound more interesting and complex. A violin with the harmonic variety of a shop vac soon becomes fatiguing to the ear.

This was one of the big hurdles that synthesized sound had to overcome. Here's an article about the necessity of making computer synth sounds more natural by inserting randomness and distortions to add character and personality:
http://www.soundonsound.com/sos/jan10/articles/warmingsynths.htm

Often harshness in the sound is the result of unpleasant harmonics. It appears that the natural vibrational modes of a violin's higher frequencies can sometimes drag harmonics off pitch (you can sometimes even see this happening on a note's fundamental, where after the bow is released a pitch can drift up or down. Sometimes it's a string problem, but very rarely it's the violin), and this is what creates the dissonance that leads to a harsher sound. In my adjustment chapter I do talk about dealing with this.

Clarity

For most people, clarity is a function of higher frequency presence, in the right places, and in tune. The opposite of clarity is veiled or foggy.

Response to bow position

A cellist in the Cleveland Orchestra showed me a very quick and easy way to determine if an instrument's tone is flexible and widely varying. Start a long bow stroke up over the fingerboard an inch or two, and through the duration of the stroke, drift the bow towards the bridge, listening for the tone quality to go from foggy and dusty, through fat and warm, past concise, and finally into hard and bright.

Many players think only in terms of getting the “best” sound out of their instrument, but a musical tool needs to have many different tonal possibilities. Humorously, this seems much clearer to rock guitarists than to classical violinists—this is the reason a Fender Stratocaster has three pickups at different spots along the string and a switch that quickly chooses among them, and why you sometimes see guitarists strumming up over the board, or picking harshly at the bridge. Violins can do this too, if it's in the violin. Quite often it's not, though, especially if the maker had the idea that there was only one proper voice for a violin, the “best” voice, and had a way to deeply engrave that sound into the violin's behavior.

Uneven strings and notes; variation over span of strings

No one likes a really uneven instrument, especially if the are big changes between strings. Sometimes more variety across the span of the strings is desirable though, and this was the idea behind the Russian stringing of wound gut G and D with steel A and E, which pushes the brighter strings towards more brightness and the bottom strings towards a darker sound. Violists often use a steel A for the same reason, and cellists regularly employ different types for the C and G vs the D and A. But in any case, the change should be gradual, and you will want to note problems in transitioning across the various strings. In particular, the violin A and cello D can be problematic, sounding quieter and duller than the strings on either side of them.

Attack and punch

When a note first receives impulse from the bow it does not immediately resolve into its final state. The character of the transient period at the beginning of a note is the primary method we use to identify which instrument we are listening to. Once the note is started, it's been proven that telling whole families of instruments (for instance a violin vs a trumpet) apart is difficult or impossible. There are both volume and pitch components to the transient.

In the most general way, the best violins start notes with a little pop, and the pitch resolves quickly. That is, the note has impact, with a clean start.

Separation

Separation is the ability of each note to separate itself from the ones before and after it. The real trial by fire for this characteristic is by what's heard in extremely fast slurred scales: even though the bowing is continuous, the notes should emerge as clearly distinct from each other, with a slight initial attack, without blurring together into a mess.

Nasality

Many older violins have a small amount of nasality in their tone. How much is desirable is purely a situation of personal taste.

Point source, or cloud

A peculiarity of really good instruments is that the sound appears to emanate from nowhere in particular. The more closely one is able to locate the violin with eyes closed, the less it conforms to this behavior. Often this characteristic is identified as being a "cloud" of sound.

This may be associated with the fact that sound radiation is not all off the top. This is why the player does not hear the same violin as the audience. For the audience, radiation from the back and sides has to travel out and reflect from something, and this reflection is part of the total sound that they perceive. That better violins create a cloud of sound may be an indication that more of the body of the instrument is active, with more parts farther from the bridge's immediate vicinity contributing to the overall sound.

Because this is a room effect, it's not audible on recordings.

Vibrato

The depth and ease of vibrato is an easy to understand indication and test of an instrument's tonal complexity. Some require only the smallest vibration to get a full vibrato, and some need extremes of finger movement to get any effect at all. Obviously, the former is much more desirable.

Boominess

As with cheap speakers, some instruments have a clear, well-defined bass, where from others it's boomy and loose. This is usually an inherent defect of the instrument, not responsive to external adjustment, but can be cured with extensive internal work.

Response

This was discussed in the previous section, but I'll mention it here as a reminder.

Magic

I leave this for last. It's the fence between the sheep and goats of violins, the thing that makes the difference between violins that have a "Cremonese" sound and those that

don't. Not all Cremonese violins have it and not all non-Cremonese don't have it, but it's the factor that is often present in the very finest makers' instruments.

It may be the last characteristic you learn to identify, and it's hard to hear unless different violins are being played against each other in rapid succession, in person. It's not audible on recordings at all, which might indicate that it's connected some way with the concept of the cloud of sound mentioned above. Lots of makers don't believe this quality exists; players are more likely to understand it. The best description might be that the sound of the violin seems to have an extra dimension to it. This addition to the quality of sound can be added or enhanced by a really fine bow, too.

Getting Ideas

Now that you have the basic idea, you can move forward learning to listen to sound and to develop ways to objectively categorize what you hear. One of the things I did at the start was to read up on the history of music synthesizers and read a book or two about how to use one. All of the problems that you might have in subdividing sound into various aspects that you can define and measure for synthesizing in your mind are things that the synth people went through 50 years ago. As I read, I began to hear more, because they had made me aware of things I should be listening for. Because of the problems they faced in recreating instrument voices, I found the way synth people think more hospitable to my progress than anything I got from formal acoustics resources.

Also, you can play with a synthesizer, too. I did that for a while. There are some software synths available online for free. The one I used is available at http://zynaddsubfx.sourceforge.net/

A poster with the user name Stratmosphere at http://www.thegearpage.net has blended together terms and definitions taken from a variety of audio sites to make the following extremely useful list at http://www.thegearpage.net/board/showthread.php?t=873107 Not all of these descriptions are relevant to the violin family, but it's a good list to derive inspiration for improving one's hearing (text below used with permission of and thanks to both thegearpage.net and Stratmosphere):

- Aggressive - Forward and bright sonic character.
- Airy - Spacious. Open. Instruments sound like they are surrounded by a large reflective space full of air. Good reproduction of high frequency reflections. High frequency response extends to 15 or 20 kHz.
- Ambiance - Impression of an acoustic space, such as the performing hall in which a recording was made.
- Analytical - Highly detailed.

- Articulate - Intelligibility of voice(s) and instruments and the interactions between them.
- Attack - The leading edge of a note and the ability of a system to reproduce the attack transients in music.
- Balance - essentially tonal balance, the degree to which one aspect of the sonic spectrum is emphasized above the rest. Also channel balance, the relative level of the left and right stereo channels.
- Bass - The audio frequencies between about 60Hz and 250Hz.
- Bassy – Emphasized low frequencies below 200Hz.
- Blanketed - Weak highs, as if a blanket were put over the speakers.
- Bloated - Excessive mid bass around 250 Hz. Poorly damped low frequencies, low frequency resonances. See tubby.
- Blurred - Poor transient response. Vague stereo imaging not focused.
- Body - Fullness of sound, with particular emphasis on upper bass. Opposite of thin.
- Boomy - Excessive bass around 125 Hz. Poorly damped low frequencies or low frequency resonances.
- Boxy - Having resonances as if the music were enclosed in a box. Sometimes an emphasis around 250 to 500 Hz.
- Breathy - Audible breath sounds in woodwinds and reeds such as flute or sax. Good response in the upper mids or highs.
- Bright - A sound that emphasizes the upper midrange/lower treble. Harmonics are strong relative to fundamentals.
- Brilliance - The 6kHz to 16kHz range controls the brilliance and clarity of sounds. Too much emphasis in this range can produce sibilance on the vocals.
- Chesty - The vocalist sounds like their chest is too big. A bump in the low frequency response around 125 to 250 Hz.
- Clear - See Transparent.
- Closed - A closed-in sound lacking in openness, delicacy, air, and fine detail usually caused by Roll-off above 10kHz; in contrast to Open.
- Congested - Smeared, confused, muddy, and flat; lacking transparency.
- Coloured - Having timbres that are not true to life. Non flat response; peaks or dips.
- Cool- Moderately deficient in body and warmth, due to progressive attenuation of frequencies below about 150Hz.
- Crisp - Extended high frequency response, especially with cymbals.
- Dark - A tonal balance that tilts downwards with increasing frequency. Opposite of bright. Weak high frequencies.
- Decay - The fadeout of a note, it follows the attack.
- Definition (or resolution) - The ability of a component to reveal the subtle information that is fundamental to high fidelity sound.
- Delicate - High frequencies extending to 15 or 20 kHz without peaks.
- Depth - A sense of distance (near to far) of different instruments.
- Detail - The most delicate elements of the original sound and those which are the first to disappear with lesser equipment.
- Detailed - Easy to hear tiny details in the music; articulate. Adequate high frequency response, sharp transient response.
- Dry - Lack of reverberation or delay as produced by a damped environment. May comes across as fine grained and lean. Opposite of Wet.
- Dull - See Dark.

- Dynamic - The suggestion of energy and wide dynamic. Related to perceived speed as well as contrasts in volume both large and small.
- Edgy - Too much high frequency response. Trebly. Harmonics are too strong relative to the fundamentals. Distorted, having unwanted harmonics that add an edge or raspiness.
- Euphonic - An appealing form of distortion that generally enhances perceived fidelity, often ascribed to the harmonic elaborations of some valve amps.
- Fast - Good reproduction of rapid transients which increase the sense of realism and "snap".
- Fat - See Full and Warm. Or, spatially diffuse; a sound is panned to one channel, delayed, and then the delayed sound is panned to the other channel. Or, slightly distorted with analogue tape distortion or tube distortion.
- Focus - A strong, precise sense of image projection.
- Forward(ness) - Similar to an aggressive sound, a sense of image being projected in front of the speakers and of music being forced upon the listener. Compare "Laid-back".
- Full - Strong fundamentals relative to harmonics. Good low frequency response, not necessarily extended, but with adequate level around 100 to 300 Hz. Male voices are full around 125 Hz; female voices and violins are full around 250 Hz; sax is full around 250 to 400 Hz. Opposite of thin.
- Gentle - Opposite of edgy. The harmonics (of the highs and upper mids) are not exaggerated, or may even be weak.
- Grainy - A slightly raw, exposed sound which lacks finesse. Not liquid or fluid.
- Grip - A sense of control and sturdiness in the bass.
- Grungy - Lots of harmonic or I.M. (Intermodulation) distortion.
- Hard - Too much upper midrange, usually around 3 kHz. Or, good transient response, as if the sound is hitting you hard. Uncomfortable, forward, aggressive sound with a metallic tinge.
- Harsh - Grating, abrasive. Too much upper midrange. Peaks in the frequency response between 2 and 6 kHz. Or, excessive phase shift in a digital recorder's low pass filter.
- Headstage - The perception of the Soundstage while listening to headphones.
- Highs - The audio frequencies above about 6000 Hz.
- High Midrange (High Mids, Upper Mids) - The audio frequencies between about 2kHz and 6kHz.
- Hollow - Recessed mids.
- Honky - Like cupping your hands around your mouth. A bump in the response around 500 to 700 Hz.
- Imaging - The sense that a voice or instrument is in a particular place in the room.
- Juicy - Sound that has joie de vivre, energy and life.
- Laid-back - Recessed, distant-sounding, having exaggerated depth, usually because of a dished midrange. Compare "Forward".
- Liquid - Textureless sound.
- Low Level Detail - The quietest sounds in a recording.
- Low Midrange (Low Mids) - The audio frequencies between about 250Hz and 2000Hz.
- Lush - Very Rich/Full.
- Lush (2) - A "lush" sound has a sense of warmth and fullness. Notes are more authoritative and have a sense of life about them. It is a sound free of any sibilance or brightness. It does not mean colored, however. It is an open and inviting sound enveloping the listener into its soundstage. (source: unkown headfier)
- Mellow - Reduced high frequencies, not Edgy.

- Midrange (Mids) - The audio frequencies between about 250 Hz and 6000 Hz.
- Muddy - Not clear. Weak harmonics, smeared time response, I.M. distortion.
- Muffled - Sounds like it is covered with a blanket. Weak highs or weak upper mids.
- Musical (or musicality) - A sense of cohesion and subjective "rightness" in the sound.
- Nasal - Honky, a bump in the response around 600 Hz.
- Naturalness - Realism.
- Opaque - Unclear, lacking Transparency.
- Open - Sound which has height and "air", relates to clean upper midrange and treble.
- Pace - Often assoc. with rhythm, a strong sense of timing and beat.
- Piercing - Strident, hard on the ears, screechy. Having sharp, narrow peaks in the response around 3 to 10 kHz.
- PRaT - Pace, Rhythm and Timing
- Presence Range - The presence range between 4kHz and 6kHz is responsible for the clarity and definition of voices and instruments. Increasing this range can make the music seem closer to the listener. Reducing the 5kHz content makes the sound more distant and transparent.
- Presence - A sense that the instrument in present in the listening room. Synonyms are edge, punch, detail, closeness and clarity. Adequate or emphasized response around 5 kHz for most instruments, or around 2 to 5 kHz for kick drum and bass.
- Puffy - A bump in the response around 500 Hz.
- Punchy - Good reproduction of dynamics. Good transient response, with strong impact. Sometimes a bump around 5 kHz or 200 Hz.
- Range - The distance between the lowest and highest tones.
- Resolution (or Resolving) - See Definition
- Rich - See Full. Also, having euphonic distortion made of even order harmonics.
- Roll-off (Rolloff) - The gradual attenuation that occurs at the lower or upper frequency range of a driver, network, or system. The roll-off frequency is usually defined as the frequency where response is reduced by 3 dB.
- Round - High frequency rolloff or dip. Not edgy.
- Rhythm - The controlled movement of sounds in time.
- Saturation - The point at which a magnetic tape is fully magnetized and will accept no more magnetization.
- Seismic - Very low bass that you feel rather than hear.
- Shrill - Strident, Steely.
- Sibilant (or Sibilance) - "Essy", exaggerated "s" or "sh" sounds in vocals. Sibilant sounds carry most of their energy through the 4Khz to 8Khz range, but can extend to 10kHz, depending on the individual. Sibilance is often heard on radio.
- Sizzly - See Sibilant. Also, too much highs on cymbals.
- Smeared - Lacking detail. Poor transient response, too much leakage between microphones. Poorly focused images.
- Smooth - Easy on the ears, not harsh. Flat frequency response, especially in the midrange. Lack of peaks and dips in the response.
- Snap - A system with good speed and transient response can deliver the immediacy or "snap" of live instruments.
- Soundstage - The area between two speakers that appears to the listener to be occupied by sonic images. Like a real stage, a soundstage should have width, depth, and height.

- Spacious - Conveying a sense of space, ambiance, or room around the instruments. Stereo reverb. Early reflections.
- Speed - A fast system with good pace gives the impression of being right on the money in its timing.
- Steely - Emphasized upper mids around 3 to 6 kHz. Peaky, non flat high frequency response. See Harsh, Edgy.
- Strident - See Harsh, Edgy.
- Sturdy - Solid, powerful, robust sound.
- Sub-Bass - The audio frequencies between about 20Hz and 80Hz.
- Sweet - Not strident or piercing. Delicate. Flat high frequency response, low distortion. Lack of peaks in the response. Highs are extended to 15 or 20 kHz, but they are not bumped up. Often used when referring to cymbals, percussion, strings, and sibilant sounds.
- Telephone Like - See Tinny.
- Texture - A perceptible pattern or structure in reproduced sound.
- Thick - A lack of articulation and clarity in the bass.
- Thin - Fundamentals are weak relative to harmonics. Bass light.
- Tight - Good low frequency transient response and detail.
- Timbre - The tonal character of an instrument
- Timing - A sense of precision in tempo.
- Tinny - Narrowband, weak lows, peaky mids. The music sounds like it is coming through a telephone or tin can.
- Tone - The sound of definite pitch.
- Transient - The leading edge of a percussive sound. Good transient response makes the sound as a whole more live and realistic.
- Transparent - Easy to hear into the music, detailed, clear, not muddy. Wide flat frequency response, sharp time response, very low distortion and noise. A hear through quality that is akin to clarity and reveals all aspects of detail.
- Tubby - Having low frequency resonances as if you're singing in a bathtub. See bloated.
- Upper Midrange (Upper Mids, High Mids) - The audio frequencies between 2 kHz and 6 kHz.
- Veiled - Like a silk veil is over the speakers. Slight noise or distortion or slightly weak high frequencies. Loss of detail due to limited transparency.
- Warm - Good bass, adequate low frequencies, adequate fundamentals relative to harmonics. Not thin. Also excessive bass or mid bass. Also, pleasantly spacious, with adequate reverberation at low frequencies. Also see Rich, Round. Warm highs means sweet highs.
- Wet - A reverberant sound, something with decay. Opposite of Dry.
- Weighty - Good low frequency response below about 50 Hz. A sense of substance and underpinning produced by deep, controlled bass. Suggesting an object of great weight or power, like a diesel locomotive.
- Woolly - Loose, ill-defined bass.

Sources for the definitions:

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