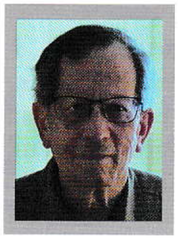

Developing Customer Loyalty

By Norman Brickman

We all take pride in the quality of the piano work that we do, and when the opportunity permits, we enjoy conveying information about that quality to our customers. This has the secondary effect of creating a trust, or loyalty, for return engagements and for generating referrals.

We help our customers understand that we are not only extensively trained to tune their instruments, but that we have gone through additional extensive training to establish a high quality of other technical services. Whether voicing or addressing noises, bobbling hammers, squeaky pedals, subtle touch issues, or analyzing issues with humidity, etc., our customers learn that they can depend on us for quality work. And we all learn to explain the problems and the repairs.

This article concentrates on the tuning portion of our work, offering suggestions for honing our explanations and demonstrations of the tuning that we perform so that our customers can appreciate our quality work. The intent is for readers to pick up some pointers that are compatible with their style and approach.

Background

Each customer is unique, so a bonding or loyalty-building process will differ for each customer. Some are very busy, and you are hired to come, do your work, and leave in the most efficient manner. Many already know your reputation from trusted sources. But I find that a good number of our customers have an interest in the piano tuning fundamentals. Many of their children who are taking lessons are also interested in the underlying nature of the piano and its tuning. Discussing the tuning of pianos can span topics that include music, physics, math, mechanics, and more.

The nice thing is that almost all of us tune using equal temperament. So, whether you tune aurally, as I do, or use an electronic tuning device (ETD), the quality of our tuning is subject to the common reasoning and explanation that is presented in this article.

When you first enter the home, volunteer your services to explain the tuning process. You can start by playing notes and chords on the piano before you tune it and discuss how they sound now and the differences to expect when you are done. The Covid-19 pandemic currently puts some limitations on this process, but there is still flexibility available here for you. You can further offer to explain your tuning process in real-time, and when you are finished, volunteer some of the types of explanations contained further in this article — depending, of course, on the reception. Students who are into music or science and math have a natural interest in learning about what you do, and from my experience, their parents appreciate the time you take to discuss the tuning fundamentals and associated science with them. Musicians who also play other instruments often have similar interests to piano tuners, such as partials and intervals for a cello player.

Below are some possible topics for discussion.

Octaves

Before you start your tuning, while inspecting the condition of the piano, you can play several octaves (or double or triple octaves) to demonstrate to your customer the obvious beating and lack of a common single note that currently exists. But a more dramatic moment is when you are done tuning. Simultaneously play three or four of the same notes throughout the scale to show one of the several important aspects of your tuning, the octaves. For example, simultaneously play C2 and C3 with C6 and C7 to demonstrate how closely you can now be perceived to be playing a single C, rather than in fact playing four notes. Repeat with C♯, then with D, etc. This short demonstration shows the quality of your work in this one aspect of a good tuning.

Partials

Just as octaves are a fundamental part of an ET tuning, a discussion of the partials associated with a vibrating string is also fundamental for academic discussions of piano tuning. This is true for the aural piano tuner and the tuner who uses an ETD as well, such as when tuning unisons or making aural checks. This is easiest to demonstrate, of course, once the piano is in tune.

Do the usual: Play one note while silently holding down another note that is two, three, or four times the frequency. Show how the fundamental excites the upper partials. If you hold down other upper dampers that are not multiples of the fundamental, you get silence when you play and release the fundamental. This process also works in reverse (often better) by playing the upper note while holding down the lower note. The upper partial is then excited on the strings of that lower note.

This is the start of a physics lesson on vibrating strings that is easy to demonstrate. You can use the first two columns of Table 1 below to help locate where the partials are on the keyboard. If we consider C, the table shows that if you play C3, then C4 (2:1) is the second partial, G4 (3:2) is the third partial, C5 (4:3) is the fourth partial, E5 (5:4) is the fifth partial, etc.

Musical Intervals

The content of this section on musical intervals will not directly relate to the quality of your tuning, but its brief explanation lays the foundation for the next section on hearing beats, which many customers will relate to.

Once your customers or their children understand how vibrating strings produce partials, this logical next step usually takes only a few minutes more and provides the introduction necessary for hearing beats. Table 1 gives the necessary foundation on intervals. It has a lot of rows (intervals), but usually you will only discuss a few in depth, and your audience may already be familiar with the concepts of a major third (M3), minor sixth (m6), or a perfect fifth (P5), for example.

Interval	Number of half-steps in the interval	Where to listen for the beats from coincident partials	Alternate Description [and if widened vs narrowed]	Musically known as
1:1	0	At fundamental + higher coincident frequencies		Unison
6:5	3	Two octaves above the "4" in 6:5:4	[narrow]	Minor Third
5:4	4	Two octaves above the upper note	[wide]	Major Third
4:3	5	Two octaves above the low note	[slightly wide]	Fourth
3:2	7	One octave above the high note	[slightly narrow]	Fifth
8:5	8	Three octaves above the low note	[narrow]	Minor Sixth
5:3	9	Two octaves above the "4: in 5:4:3	[wide]	Major Sixth
16:9	10	Four octaves above the low note	[wide]	Minor Seventh
2:1	12	At high note + its octave + more		Octave
5:2	16	One octave above the high note	Octave + Major Third	Tenth
3:1	19	At high note + higher coincident frequencies	Perfect 12th / Octave + Fifth	Twelfth
4:1	24	At high note + its octave + more	Double Octave	Fifteenth
5:1	28	At high note + higher coincident frequencies	Double Octave + Major Third	Seventeenth
6:1	31	At high note + higher coincident frequencies	Double Octave + Perfect Fifth	Nineteenth
8:1	36	At high note + its octave	Triple Octave	Twenty-Second

Table 1: Musical Intervals.

The objective is to explain how the musical intervals that they learn about in their music lessons relate to the partials of a vibrating string. The human ear subconsciously recognizes the sanctity of the intervals due to the commonality (or coincidence) of the partials, explained further in the next section. The lower the coincidence numbers, the more likely we are to recognize the interval when it's played. For example, a fifth (3:2) is much more "natural" to recognize than, say, an 11:12 interval ratio.

Beats and Coincident Partials

Whether you tune with an ETD or aurally, teaching your customer to hear the beats of an interval and the progression as you move up or down the scale with that interval (or in the case of a unison, to hear no beats) can provide important reinforcement as to the quality of your tuning. In my experience, most people will hear the beats from the coincident partials after only a couple minutes of explanation.

Play a major third as an easy-to-demonstrate interval, selecting a position on the keyboard where it beats at perhaps 6 or 7 beats per second (bps). Table 1 shows how to recognize a M3 on the keyboard, and Table 2 shows the beat rate to expect for an interval in octave 4. For example, E3 to G♯3 will beat at approximately 6.5 bps (half the rate shown in Table 2 since E3-G♯3 is in the third octave, not the fourth octave given in the table). Explain how the coincident partial is at G♯5, explain that we ignore the sounds at E3 and G♯3, and with a couple of tries, you will usually have a customer both hearing and understanding the nature of beating intervals.

After the customer can hear the beats, and if they are interested in more, you can easily demonstrate the progression of beat rates as you go up or down the scale, and explain the importance of that progression. As indicated, this whole process of demonstrating interval beats using a M3 takes only a few minutes, and by being observant of your customer, you will judge their interest in proceeding further with other intervals.

Equal temperament beatings (all figures in Hz)

261.626	277.183	293.665	311.127	329.628	349.228	369.994	391.995	415.305	440.000	466.164	493.883	523.251
0.00000			14.1185	20.7648	1.18243		1.77165	16.4810	23.7444			C
		13.3261	19.5994	1.11607		1.67221	15.5560	22.4117			B	
	12.5781	18.4993	1.05343		1.57836	14.6829	21.1538			A♯		
11.8722	17.4610	.994304		1.48977	13.8588	19.9665			A			
16.4810	.938498		1.40616	13.0810	18.8459			G♯				
.885824		1.32724	12.3468	17.7882			G				Fundamental	
	1.25274	11.6539	16.7898			F♯					Octave	
1.18243	10.9998	15.8475			F						Major sixth	
10.3824	14.9580			E							Minor sixth	
14.1185			D♯								Perfect fifth	
		D									Perfect fourth	
	C♯										Major third	
C											Minor third	

Table 2: Equal Temperament Beat Rates (Values expressed in Hz).[1]

Show the Tuning Steps

Whether you tune aurally or with an ETD, it is interesting to demonstrate the process that you go through in tuning the piano, note-by-note. As an aural tuner, I have a separate set of charts that shows the sequence followed to first set the temperament, and subsequently to go up or down the scale to extend the tuning. I use the tuning technique that John Travis developed that has also been referred to as the "up-a-third, up-a-third, down-a-fifth" sequence.[2] You can take an interested customer through the process, including showing the tests to validate adherence to equal temperament at each step of the process. You can show how the intervals that were discussed above play an active accuracy role throughout the tuning process. As I mentioned above, customers will be able to hear the beats, and you can provide an explanation of the reasoning for their use.

Inharmonicity

We understand the importance of inharmonicity in the piano's scale and the role it plays in our tunings. You will find that sophisticated customers have already been introduced to this concept, and they are happy to learn that your tuning incorporates the inharmonicity that the Railsback curve (Figure 1) represents.

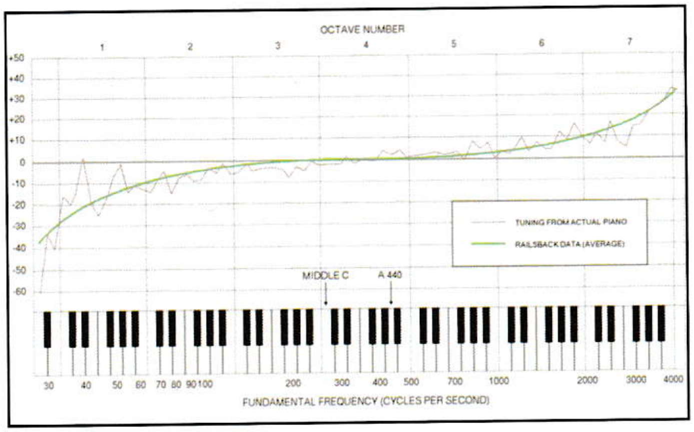

Figure 1: The Railsback curve, indicating the deviation between theoretical and real-world piano.[3]

Explain how your tuning approach incorporates inharmonicity, which as you can see reaches 30 or 40 cents at the extremes of a piano's scale. Most ETDs now simply analyze the inharmonicity of a particular piano in real-time, starting at the beginning of a tuning and proceeding from there. For aural tunings, the inharmonicity is included in each interval that is in use in the tuning process. For example, we might say that an octave is being set as 4:2 (using a major third and a tenth) or a double-octave 4:1 (incorporating a 17th). But if we are forced to be precise, we acknowledge that our standard practice is to tune theses octaves wide, and that the aurally set 4:1 (or 4:2) is actually measurably enlarged slightly beyond 4:1 in conformance with the Railsback curve. Explain how our (ETD or aural) tuning approach gets the 4:1 interval musically correct, with an accompanying frequency measurement at slightly more than 4:1.

Other Discussion Points

Each of us will have other topics that we enjoy discussing and that will likely come up in conversations. For example, aural tuners can explain tests that are continually in use during a tuning or techniques used to ensure stability, such as setting the pins. Some of us will explain that we tune ambidextrously, tuning grand pianos right-handed and uprights left-handed, for example. Some technicians prefer to tune during the attack portion of striking a note versus the sustain portion; an ETD can show the difference in pitch from attack to decay.

Exceptions to Equal Temperament

As noted earlier, a small number of piano tuners opt to not tune to equal temperament. Equal temperament has been a foundation in Western keyboard music for more than 200 years and an industry standard in the piano world for more than 100 years. But it is always important to encourage innovation and creativity, and a non-standard piano tuning should be evaluated on its merits.

The non-traditional tunings can still fall within the ET framework, or they can be non-ET based. Their use will modify some of the discussion points that have been outlined in this article and may require a substitute for others. I will only briefly introduce here a couple of common examples and mention how the above sections might be changed for those tunings.

1. *Pure Fifths or Twelfths:* Some tuners prefer to set all fifths or fourths pure, at least in a part of the scale. This can be done in either an ET manner, such as 19-TET based on the 12th, or in a non-ET manner. The result for this article's purposes is that at least the above section on intervals will need to be modified if a non-ET is used, since the intervals will not have the even progression that was discussed. For those technicians who are not using ET or well temperament, there will not be universal modulation available for different musical key signatures either.
2. *Historic Temperaments:* Some temperaments select certain intervals to adjust within the octave, often having some (but not all) pure fifths and fourths. These historic temperaments can be of a few basic types, such as quasi-equal or ET substitutes, well temperaments, modified meantone temperaments, meantone, and just intonation temperaments. Well temperament has some favorable characteristics and allows modulation reasonably to most musical key signatures. Just intonation, meantone, and modified meantone temperaments range from highly to modestly restrictive (respectively) when it comes to modulating through the key signatures.[4]
3. *Guidance and Suggestions:* For the customer who is interested in historic temperament tuning, the tuner can advise on the musical sound advantages and disadvantages for such tunings and on the accompanying limitations,

including musical key signature modulation limitations.[5] As the referenced articles will point out, it is very helpful with historic temperaments to own multiple acoustic pianos to support tunings for multiple musical key signatures. Another modern alternative is to have a software-controlled electronic piano that can be instantly re-tuned or re-configured to a variety of temperaments according to the tonal qualities desired and the musical piece being played.

A Final Note

The above steps convey to your customers your knowledge, training, and dedication in producing an excellent tuning. This set of discussion topics will give you an opportunity to show your enthusiasm and your qualifications for tuning and demonstrating the results. Your customers will appreciate it and it will, I believe, reflect well on your tuning business. What's more, you have given your customers the gift of knowledge about their pianos, which many will be very proud to have.

Endnotes

[1] Wikipedia, article on "Piano Tuning," table on "Equal Temperament Beatings." en.wikipedia.org/wiki/Piano_tuning.

[2] Travis, John W., *Let's Tune Up* (Takoma Park, MD: Self-published, 1968), chapters 10 and 11.

[3] "The Railsback Curve," taken from a Wikipedia article on piano acoustics. wikipedia.org/wiki/Piano_acoustics.

[4] See the discussion on the Pythagorean comma at wikipedia.org/wiki/Pythagorean_comma, or from a piano tuner's perspective, see "The Tuner and the Tempered Fifth" by F. L. Donelson, *The Tuners' Journal*, Vol. 1 No. 4, page 8, September 1921 (available on the PTG website).

[5] A few starting points to read about historic temperaments: a440piano.net/historic-temperaments, radfordpiano.com/soundboard/historical-temperaments, and cambridgepianotuner.co.uk/newsite/historic-temperaments/.

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