On 11/16/05 David Andersen wrote to the Pianotech chat list, a worldwide forum for technicians:

> Hi, folks----I got a beautiful letter from **Virgil Smith** today about my
> **tuning article** in this month's **Journal**; I'm so happy he liked it, and
> it gave me a thrill to be acknowledged by him.
>
> What did you guys think of it? I'd love some feedback, praise, scorn,
> whatever.....
>
> David Andersen

On that same day, my respected colleague David Nereson, RPT, wrote back:

You asked for it:

"Cracking" a unison sounds to me like nothing different from tuning a truly beatless unison, which we all strive for anyhow, but maybe don't actually accomplish on each and every tuning, except perhaps on an extra-special "concert tuning" on which we spend two or more hours.

Under "A Few Helpful Hints," you say the "true beat" doesn't appear for 3-5 seconds after the two notes are played, especially in the fourths. But two paragraphs hence, you say the fourths all beat at 1.5 - 2.5 bps! If they're beating that fast, how can it take 3 - 5 seconds for the ("true," whatever that is) beat to appear? In the same paragraph, you say A3-D4 and C4-F4 might even beat faster than we think would be right. What's "right"? I assume we're tuning equal temperament, in which case fourths in the temperament area beat at about 1 bps. 2.5 bps for a fourth would be quite noticeable, I would think. But with all three strings open (which, in the end, when doing a final check, is how we would listen to the piano anyhow), you say the beats slow down a bit. I don't agree that having the unisons tuned will slow down the beat of the interval! Do they actually slow down or just seem to?

The terms you use to describe widths of intervals, such as: swellingly beatless, almost beatless, very slightly narrowed, a tiny bit, a frog hair, slightly, a hair, a little, ever-so-slightly more, quite a bit more, slow roll, a bit, slower than, just a bit, super fast, and slightly narrow, are all too subjective to actually use in precisely setting a temperament, in my opinion. Without defining what these means in terms of beats per second, temperaments tuned with these guidelines by several different tuners probably would all come out differently.

Then in the third-to-last paragraph, you say, "If all the fourths on the piano are beating the same slow roll, then the stretch will be exactly on the money out to the extremes." I really don't believe this is true, and certainly not for all pianos. The beat speeds of fourths and most other intervals increase slightly as one ascends the scale in a piano tuned to equal temperament. And is there really such a thing as the stretch being "exactly on the money"? Different degrees of inharmonicity in different pianos require different amounts of stretch.
As someone else replied:
>Do you really think this is equal temperament? <g> "I have found that
>A3-D4 and C4-F4 beat slightly faster."
If that's so, how can the thirds and sixths progress evenly?
>A jocular quibble of little consequence.

Of more than a little consequence, in my opinion.
Also, I know that the "Virgil Smith phenomenon" has been demonstrated, or supposedly "proven" with an ETD, but in my opinion, it is so small that's it's negligible. Maybe one in a hundred pianists, if that, would even detect it. If you're regularly tuning for the world's most demanding concert artists, it may be something to consider. But for the spinets, consoles, and 5-foot grands those of us "in the trenches" deal with every day, and which almost all require a pitch raise because they get tuned only every 4 to 7 years, nah! I'm sorry. It's just not worth all the extra time "cracking" unisons when they're going to drift out of tune by next week anyhow, because of the pitch raise.
But I'll try the temperament sequence, and maybe reserve the technique for the next time I tune in **Carnegie Hall** or **Lincoln Center**.

As an aside, though I respect **Virgil Smith**, his accomplishments, and long-time career, tuning for top clients, and acknowledge that in his mind, he knows what he's talking about, I have yet to see an article that explains scientifically what is actually happening with the partials and beats in what he calls the "natural beat" (of all the partials sounding simultaneously, as opposed to listening to just two coincident partials). I have yet to hear that "natural beat." I can play an interval, with or without unisons tuned, and hear the various beatings of various coincident partials, and usually one is strongest, but if that's what he means, he should say so. If anybody else knows what the so-called **"natural beat"** is in scientific terms, i.e, exactly what is being listened to, what its beat speed is, etc., or if its an

entirely different phenomenon that only a select few can hear, why don't they write an article and clue the rest of us, or at least me, in?

--David Nereson, RPT

And then a point-by-point response by moi:

Hey, **David Nereson**----

Thanks for the feedback; I'll just touch on what I think to be the major misunderstandings; I'm open to the possibility that my article wasn't as clear as it could have been, or that someone---perhaps like you---with a scientific/engineering bent would seem to dismiss it as too colloquial and **"unproveable."**

>"Cracking" a unison sounds to me like nothing different from
>tuning a truly beatless unison
No; it specifically and clearly refers to the practice of making microtonal changes in the PITCH of a **3-string unison**. Truly beatless unisons are necessary in every tuning, in my practice. Pitch stabilization is very important, as are stood-still unisons, on a **Baldwin Acrosonic** or a **Fazioli** concert grand.

>Under **"A Few Helpful Hints,"** you say the "true beat" doesn't
>appear for 3-5 seconds after the two notes are played, especially
>in the fourths.
In my experience, especially in the lower half of the piano, the **inharmonicity**, "garbage tones," ghost tones, whatever, sometimes obscure the slow beat of the **fourth** when the two notes are played. The word "true" doesn't have any **voodoo** or esoteric meaning---the true beat as opposed to false beats.
>But two paragraphs hence, you say the **fourths** all beat at 1.5 - 2.5 bps!

Yes. In my system, which is assuredly equal temperament, the **fourths** beat a bit faster than in some other systems, but the progression of **thirds** and **sixths** is close to ideal every time. That's part of the beauty and utility of this system. Making that **"ladder of fourths"** in the article all beat at RELATIVELY the same beat speed, almost always somewhere between **1.5** and **2.5 bps**, will give you ideally articulated, progressively faster **thirds** and **sixths**; all the classic temperament checks work out very, very precisely with my system.

>If they're beating that fast, how can it take 3 - 5 seconds for the
>("true," whatever that is) beat to appear?

See above.

>I assume we're tuning equal temperament, in which case
>**fourths** in the temperament area beat at about 1 bps.

With all due respect, sez who? I'd love to know where you got that. Interesting statement.

>**2.5 bps** for a **fourth** would be quite noticeable, I would think.

David, I wish you could sit next to me while I tune a piano; all the theoretical and un-understandable would become practically apparent to you.

That's why, in the article, I say "faster than you may think would be right." We need to challenge our long-held assumptions every so often.

>But with all three strings open (which, in the end, when doing a
>final check, is how we would listen to the piano anyhow), you
>say the beats **slow down** a bit. I don't agree that having the
>unisons tuned will slow down the beat of the **interval**! Do they actually slow down or just seem to?

Great question...they just **seem** to; I don't pretend to understand the science involved, I just experience the practical reality when I tune. When all three strings of two notes are "stood still," made **beatless**, the beat of the **fourth** SEEMS to slow down, or have the hard edges taken off it somehow; it blends more; I call it a

psychoacoustic illusion. On the other hand, weirdly, when there's stood-still unisons and you play a **major third**, the beats SEEM to be slightly faster. Again, no attempt at explanation from me, just reporting a phenomenon I experience every day.

>The terms you use to describe widths of intervals---swellingly
>beatless, almost beatless, very slightly narrowed, a tiny bit, a frog
>hair, slightly, a hair, a little, ever-so-slightly more, quite a bit
>more, slow roll, a bit, slower than, just a bit, super fast, and
>slightly narrow, are all too subjective to actually use in precisely
>setting a temperament, in my opinion.
Again, my attempt at being a bit out of the box. I could say **.10** cents, or **.50** cents, but the tempering is truly different for every piano, as you say.
Remember: tuning is a BODY experience, a whole system experience, not just a cerebral one. I'm trying to inspire people to remember that, and this is an attempt. All this would be SO much easier to show rather than tell.

>Without defining what these means in terms of beats per second,
>temperaments tuned with these guidelines by several different
>tuners probably would all come out differently.

I disagree...I follow up on some of the best tuners in the world---IMO---here in LA: **Keith Albright, Richard Davenport, Ron Elliott.** All of our tunings sound, within incredibly precise parameters, pretty much the same; the only differences I can consistently perceive are the slightly, and I mean **slightly** different stretches we use at the top and bottom of the piano, on the notes at the bottom of the **treble bridge**, and sometimes the quality and consistency of the unisons in the **high treble**. Ideal equal temperament is ideal equal temperament. Tuners who make a piano sound radically better than it did when they started get all the

good work; this has been true as I know it in the piano world **forever**, and certainly in my personal experience for **32** years.

>Then in the third-to-last paragraph, you say, "If all the fourths on
>the piano are beating the same slow roll, then the stretch will be
>exactly on the money out to the extremes."
>I really don't believe this is true, and certainly not for all pianos.
Well, we'll have to agree to disagree, like civilized men. "Exactly on the money" means, to me, that the tuning sounds soaring, and musical, and like a **recording**; it means that to my ears, a triple or quadruple octave sounds **beatless**, the bottom of the piano sounds deep, warm, and resonant. It sounds great to me, and that means it sounds great to my **client**s, many of whom are recording studios and professional piano players. A tuning like this, made precisely repeatable, as my system enables one to do, guarantees the success of a piano tuner. I'm just trying to help more tuners get into the high end of the business, where all the money and security is. Really.

>The beat speeds of fourths and most
>other intervals increase slightly as one ascends the scale in a
>piano tuned to equal temperament.
Again, **not my experience** tuning **500-600** times a year for the last **32** years. The beat speed of the **fourths** stays constant from one end of the piano to the other in a precise ET tuning. **Virgil Smith** has stated this for decades.

>And is there really such a thing as the
>stretch being "exactly on the money"? Different degrees of
>inharmonicity in different pianos require different amounts of
>stretch.
Exactly my point throughout this reply. These are **custom** tunings, based on the **individual** characteristics of each piano. Hence the **subjective** or **colloquial** descriptions of the minute distance changes between notes, i.e., "swellingly beatless."

>As someone else replied :
>Do you really think this is equal temperament? <g>
>"I have found that **A3-D4** and **C4-F4** beat slightly faster." If that's
>so, how can the thirds and sixths progress evenly?
> [A jocular quibble of little consequence.]
>Of more than a little consequence, in my opinion.
I'm not an engineer or mathematician; I'm a working **pianotech**, and I'm reporting on what I have found over my years of working in the high end. Come and hear me tune, and you will see & hear that what I say is, in my tuning, **true**. Slightly **means** slightly, and I qualify it by saying, I think, **"in most pianos,"** or something like that.

David [Nereson], I'm glad you respect **Virgil Smith** and his work. He is a hero of mine for many reasons. **Respect**, in my world, means an openness to another's deeply held beliefs, and a relative suspension of the hardness or rightness of your position to seriously consider another's point of view. The **essence** of **Virgil's** message has always been, it seems to me, that one's ears, one's "body perception" of sound, is something to trust, believe in, and incorporate into your tuning.
There is a time to trust your logical, **left brain**, and there is a time to trust your ears and your whole body. That's why articles about either **playing** or **working on** pianos are ultimately limited---it's a kinesthetic experience that can't be delineated or captured fully in words.
I hope we get to spend some time together in front of a piano; perhaps then **experience** would replace **belief.**

My best to you---
David Andersen
Malibu, CA