

by Jesse Mank

how to tune everything

One of my daughters, just four years old, wants ice cream right before bed. There's just no way. She is throwing a tantrum of astonishing magnitude, and I'm documenting it—partly for posterity's sake (this, too, shall pass) but mostly because I cannot believe it. I'm videoing it the way I'd be inclined to video a meteor shower or a fistfight at the mall. My wife and I are reasonable people, educated people; how did it come to this, the halls of our home echoing with demonic screams? I try to guide my daughter to bed, but it results in a further display of fiendish rage, this time at me directly: "You're not listening!"

There is no such thing as a professional parent. No prerequisite courses, no official credentials to acquire. Life is your training for parenting, though it is generally accepted that not all training programs are equal. No one escapes childhood unscathed. Every parent begins and ends as an amateur, learning along the way but also screwing up left and right. All any decent parent can do is damage control.

This generous attitude about the inexactitude of parenting applies to little else in life. We don't, for example, forgive doctors very easily when they screw up. This is because, unlike parents, they are professionals. They have been trained and certified, and we see these credentials as a safeguard against malpractice. But do consider, I am a New York State certified English teacher, respected by my peers, administration, and students. I earned the prerequisite bachelor's degree in secondary English education and a master's in English. I passed a series of state-mandated examinations with flying colors. I attended safety courses, cleared a federal background check, underwent a four-month mentorship, endured countless hours of yearly professional development, and read dozens of books on contemporary pedagogy.

Still, I make mistakes.

Like parenting, there doesn't seem to be one right way to teach, one that works for every student, every time...or even most students, most of the time. I am not saying that teachers should not be trained, but it's safe to say that I have learned more about teaching while on the job than I did in my training program. In fact, as pedagogical trends shift, I have had to unlearn some things from my formal education. I suspect that this is true of other professions, which is enough to undermine one's faith in the system. What we know about practically anything seems to be outmatched by all that we haven't yet figured out.

My screaming child, my parental doubt, the inadequacies of education, the tension between professionals and amateurs—it all led me to finally do something about the out-of-tune piano in my basement.

As an amateur musician, I've never taken formal lessons and can barely read sheet music, but I've independently recorded and published over 400 songs and enjoy a modest number of listeners around the globe. When we bought our house, I aimed to realize a lifelong dream of mine—to have a basement studio space where I can write and record music any hour of the day with no danger of disturbing anyone. And I wanted it to have a piano, even though I can barely play. (I would learn!) Though I am neither a professionally-trained carpenter nor a professionally-trained electrician, I put up some walls and ran the necessary electricity with a little help from friends who are also not professional

carpenters or electricians. I'm a handy person to have around if you need something soldered, or sewn, or designed, or built, or repaired, or composed. I'll paint a mural just as well as I'll paint the garage. I play guitar, bass, and drums and I sing. I've managed a few clarinet parts and taught myself a C scale on the flute. I'll be the first to admit that I'm not exactly great at any one thing, but there's a lot that I'm good at, and passably so. I suffer the plight of the dabbler, the promiscuous craftsman unwilling to commit to one craft, too full of lust for any and every occasion to create. That's me, an amateur everything. A hack of all trades.

The piano came from a Craigslist ad that offered it for free so long as I paid to move it. Once arrived, I needed it tuned. I tune my guitar all the time. How hard can it be to tune a piano? I did an internet search, and the overwhelming professional consensus was that you are a fool if you think you can tune it yourself—the equivalent of “you'll shoot your eye out.” I read cautionary articles published by professional piano tuners who shared horror stories about amateur tuning gone wrong—notably broken strings and bent tuning pegs—but more often than not I'd find them in the comments of video tutorials explaining, quite logically, why the videos offered bad advice. Sometimes they were smug: I'll never be out of work, fixing what these DIYers do to pianos. Sometimes they were rude: Rename this video the Redneck Tuning Method. Lol... Created by someone who has no idea what he's doing but insists that he does. So laughable.

Because professional piano tuners have a vested interest in deterring amateurs from successfully learning how to tune pianos, I was tempted to dismiss their warnings. But with approximately 160 pounds of tension on each of the 230 piano strings, it looked like a formidable task that, if done improperly, posed a believable threat to the functionality of the instrument. Otherwise a fearless do-it-yourselfer, I had a hard time managing the hubris to tackle this one. I called a professional.

The piano tuner arrived in a car decorated with conservative Christian bumper stickers. His condescension toward me, an artist-type with screwy hair, was barely contained, so it felt awkward and maybe a little violating to have him down there in my home studio for two hours while he tuned. I feared that he'd call me a baby killer or make me pray the rosary, but two uneventful hours later, he packed up his various gauges, wrenches, and meters. He told me that it was the best he could do with an instrument of such poor quality. And while that made me feel stupid for about ten minutes, I soon felt excited to hear my piano for the first time.

It did not sound good.

The keys had a sluggish response time and the tone was dull. Two keys barely worked, and over the course of a week, stopped working altogether. One key buzzed. Another strangely rang out after it was struck, as if it were howling for mercy. This was a moment when being an untrained and inexperienced lifetime amateur caught up with me. I made a poor choice in taking the

Craigslist piano. Still, it was a real piano, not a fake-sounding synthesizer or midi plug-in. Maybe I could learn to love it, faults and all.

Until I discovered that the professional tuner inexplicably tuned it 22 cents flat from concert pitch.

What this meant is that if I ever wanted to use the piano on a recording (and of course I did), I would have to tune all the other instruments to the piano, which would preclude fixed-pitch instruments like glockenspiels or organs. It meant that I couldn't just, on a whim, add piano to a nearly completed recording tuned to standard concert pitch. It was disappointing and frustrating, but what were my options? The piano weighed nearly 400 pounds, so it's not like I could've taken it to the curb to get a new piano. The simple solution would be to call the guy back and make him fix it, or even better, call a different piano tuner. But the longer I used my studio space, the less I wanted a stranger in my sanctuary. Or so I tell myself. I actually just didn't want to be ridiculed by another professional. The piano became a source of shame, especially since, it being barely playable, I barely played it.

Years passed. Every six months or so, I got the itch to do something about the piano. It wasn't that I necessarily doubted my ability to do it—I'm mechanically inclined and have a good ear for pitch—it was the collective chorus of professionals that scared me away. Professionals have a way of making me feel like a child, naive and foolish for thinking that I could ever do something they were properly trained to do. Stay in your lane, I can hear them saying. You don't know anything! Who do you think you are? You're going to screw it up! My internal voice of self-doubt and insecurity almost always appears as a professional.

There are fields that unequivocally require professionals—I wouldn't want to be treated by an amateur dentist, for instance—but I'm not so convinced when it comes to the arts or even many trade school jobs. I mean, on one hand, of course we should respect trained professionals. Credentials provide authenticity, a form of validation from a higher authority that is not easily attained. That definitely means something. I know that I value what I learned during my brief time in art school, even if I never became a professional artist. The professionally-trained may, to some degree, be right to undermine the adventurous amateur. We will screw things up. But I think we're all mostly okay with that. Resilience is the hidden curriculum of amateurs.

In her 1939 essay “Amateur Versus Professional,” experimental filmmaker Maya Deren reminds us that the word amateur is derived from the Latin word for lover. She argues that the amateur is superior to the professional because one who does something for love rather than economic necessity is someone who is beholden to no one, enjoying absolute artistic freedom. Deren's filmwork set the tone for art cinema in the decades to come, influencing and empowering a generation of amateur filmmakers who sought to use the medium for artistic expression rather than commercial storytelling. In true DIY spirit, Deren was

also a choreographer, dancer, film theorist, poet, and writer. Decades later, punk and hip-hop offered a similar ethos. You don't need credentials, just cred. Driven by a force other than money provides its own form of authenticity. Didn't Van Gogh die having sold only a single painting, with over 900 completed? Weren't The Beatles untrained amateurs who changed the course of popular music? Wasn't it Oscar-winning Brad Pitt who never took an acting lesson in his life? Okay, that's a bad example.

I decided that if the world was going to allow me to be an amateur parent, I was going to allow myself to also be an amateur piano tuner. I ordered an entry-level piano wrench and, ever the autodidactic, began reading everything I could about piano tuning. The first thing I learned is that tuning is a lie. Virtually all of the music of the recorded age that we know and love—every single pop song—is slightly out of tune.

In order to explain, I have to start at how we arrived at just twelve notes. When a string is plucked or struck, we think we're hearing a single note, but that's just the fundamental note. Owing to a natural phenomenon called the harmonic series, we're simultaneously hearing higher notes. This is because the string vibrates from end to end, but it also vibrates in smaller, equally divided parts. These additional notes are called overtones. The third and the fifth harmonic overtones are uniquely different from the fundamental tone, and if you were to add a string and tune it to one of these uniquely different overtones, that new string would produce more uniquely different pitches in the third and fifth harmonic overtone. By repeating this process, we find twelve unique tones are derived from the first fundamental tone, and all Western music is supposedly based on those twelve tones.

Except it's not.

If you let math and physics do their thing, there are two problematic consequences to this twelve note system. First, by taking overtones and dividing them by multiples of two and three, you will never arrive at precise octave notes because powers of two and powers of three will never be equal. The musical consequence is that every set of twelve tones, going higher and lower in pitch, will be slightly out of tune from each other. Now, of these twelve tones, only a handful—seven actually—have a harmonious relationship, that is, they share overtones (DO-RE-MI...) We call these notes a key, which leads us to the second problem. The twelve tones are not equally spaced from each other, so when you change keys (or shift the seven musical notes elsewhere), it alters the mathematical relationship between the notes. They are no longer in tune and no longer musical.

How do we solve this problem? Well, we could have decided that all music has to be in one key or created instruments dedicated to a single key. However, what we've chosen to do is to ignore math and science.

Contemporary tuning starts with precise octaves (a 2-to-1 ratio) then makes all the tones in between equidistant, even though, from a physics perspective, most of these notes are now

slightly out of tune from each other. It's called equal temperament, and while it allows for easy key transposition, instrument-making, and compatibility, it's an aberration of the laws of nature. An instrument in tune is also out of tune. Rather than aligning naturally-occurring sound waves to produce harmony, we have decided that close enough is good enough.

And apparently it is. The entire canon of popular music adheres to this convention. Our ears have adapted so well that tuning an instrument according to the laws of nature would likely be perceived as being out of tune. Digital synthesizers, which could very easily overcome the inconveniences of natural (or just) tuning, are tuned to equal temperament. Hell, I have thousands of albums, all recorded in equal temperament, and never have I complained about the fact that, in the key of C, the major third has been resolved from 327.03Hz to 329.63Hz.

Maybe the generous attitude about the inexactitude of parenting also applies to tuning instruments.

The wrench arrived, but I wanted to try to fix the broken keys before I started tuning. This involved removing board after board from the piano, then the keys, until I was faced with a large, extremely fragile-looking apparatus—the contraption that makes the keys work. It looked skeletal, or robotic in a steampunk way, a Rube-Goldberg machine with hundreds of miniature wooden hinges and felt-tipped hammers, some connected with bands of thin fabric. It smelled like a carousel ride, aged wood with a note of oil. For a moment, I thought I heard a professional: Are you out of your mind? Can't you see how much there is to go wrong? Who was quickly countered by my inner amateur: You'll either fix it or you won't, but you'll definitely learn something. And so it was. I took a deep breath and started lifting it out of the piano's shell.

It was heavy and awkward as I carried it upstairs, metal tines splayed out in domino fashion as if it were warding off a predator. I set it on the dining room table and spent the next hour studying it, tracing each part to understand how it was supposed to work so that I could figure out why some parts didn't. In time, I found several wooden pieces that were cracked. With a careful hand and superglue, I managed to fix all the broken parts in about two hours. I even lightly sanded the felt hammers to reduce the deep string impressions left from years of playing. Then, as I walked by it to make a cup of tea, my sweater snagged on one of its many brittle parts, sending several 73-year-old pieces flying across the room, catapult style. That set me back another hour, but before the night was through, I had it all back inside.

Did you know that it is impossible to tune a piano? I mean, beyond the problems of equal temperament. Tuning a piano requires one to ignore the very physics that establish what we understand as musical harmony. The variances of string length and thickness, especially at the extreme ends of the instrument, introduce a problem called inharmonicity, wherein the overtones stray, creating a perceived pitch that is sharp or flat from the

fundamental tone. It's a physics problem. When a string is pulled taught, the very ends are less flexible than the center. The piano's highest notes have very short strings and are therefore less flexible for proper vibration. Then at the very low end, the thickness of the strings make them too stiff to vibrate with precision. Piano tuners remedy this problem by employing something called stretch tuning; they tune the high notes slightly sharp and the low notes slightly flat.

If an instrument had only one string to tune, the laws of nature could be followed without a problem. But the more strings you add, especially if they vary in dimension (and they almost have to in order to produce a full spectrum of pitches), the more problems you introduce. Science gets left behind in the realm of theory. Welcome to reality. The same could be applied to teaching high school English. One student, no problem. But when you have a room full of kids with varying abilities and needs, all that pedagogical theory you learned in grad school begins to sound like doublespeak. You teach in the moment, tuning and re-tuning the lesson, knowing that it's never going to be perfect.

To tune anything, one must accept that perfection is a religion whose adherents will never meet their maker. To be close enough is often divine.

The first time I tuned the piano, I failed because I chose to ignore what I learned from my research. Why? Because I am a fool. I read that one should first tune the notes sharp then lower them to pitch. This is counter to what one should do when tuning a guitar, and being a guitarist, I did what felt right. Which was wrong. I had about half of the piano tuned, and because it was late and I had already been at it for over two hours, I went to bed and left the rest for the next evening. For reasons that only a trained professional could explain, many of the notes went flat. I had to start over.

The second time I tuned the piano, I failed because I again chose to ignore what I learned from my research. I used an electronic tuner, thinking it would make the piano better compatible with all my other instruments. I was wrong. It didn't sound good against itself, and much of this had to do with the fact that I didn't employ stretch tuning. I was supposed to start with middle C octaves, then fill in the rest against them, repeating the process with the fifths and so on. This time I heard my daughter's voice: "You're not listening!"

To tune anything, one must listen, yes, but first know what to listen for.

This is where the shortcomings of the adventurous amateur become apparent. We are everything the professionally-trained say we are: naive and foolish, pompous for thinking we can waltz into anything and just figure it out. We are driven by ego. We think we know everything, or that everything can be known easily or even known at all. The professionally-trained get humbled by the vastness of skill and knowledge needed to make the world work.

If they have any ego at all, it's because they have earned it. They have studied and practiced and they are great at what they do.

Sometimes, and only sometimes, I wish I could be one of them.

It took me about four times as long as a professional tuner, but the third time I tuned the piano, I succeeded. I am a firm believer in metaphorical weight—that is, whatever we are doing literally, we are also doing metaphorically. It is why I do not like running on a treadmill. I'd rather run around the block, as going in circles is better than going nowhere. The metaphorical weight of piano-tuning is as deep as it gets. The tuning pins are difficult to turn, so manipulating the wrench, which is long and heavy, requires considerable discipline of the arm muscles. To successfully make the necessary infinitesimal movements, you must forget that you exist and become one with your arm. As two tones approach each other in pitch, they begin to "beat," that is, we hear the two sound waves pulsing in and out of phase. The closer they get, the slower they beat, until they beat so slowly that they align and sound as one. Be forewarned! The ears will forgive two waves that are almost aligned in the same way that the eyes will make sense of a slightly blurred image. In order to tune precisely, you have to listen, really listen like you've never listened before. You must move the wrench such a small increment that no actual movement is perceived. It's as if you are willing the tones to align, and when they do, it's like magic. They lock. You feel it in your arm and ear and the air all around you. No exaggeration, it's quite zen.

The power of losing yourself is real. It happens when people meditate, do yoga, or even pray. It happens to long-distance runners. I've experienced it as a musician and as a painter. You become so entrenched in your work, that you transcend your self. Some call it flow. It's about being so open to an experience that you and all your petty concerns disappear. There's a reason why doctors and yogis recommend these kind of experiences. It's because when you lose yourself, you reset yourself. You return lighter, less burdened by all you were carrying before you began.

Another way to put it—when you become one with something other than yourself, you have tuned yourself to it. You have listened, really listened, until you have willed yourself to align with another part of the universe.

It's been a few months and the piano remains mostly in tune, but like all things, I can hear it slowly returning to its natural state—chaos. I'm okay with that. I know how to bring it back.

As for my four-year-old daughter, she's five now, and I can't watch the video of her tantrum. Just thinking about it makes me sad. It's clear to me now that she didn't really expect ice cream right before bed. Her source of pain was the unresolved desire for something that she knew was unattainable—the simplest recipe for heartache I know. It's a pain that never stops being painful. The kid was right, I wasn't listening. I'm not going to beat myself up over it, though. We've both moved on—just a couple of amateurs trying to figure it all out. 