Building Better Intonation

Ethan Chilton, tonebase trumpet

1. Acoustics and Resonance
2. Practice Exercises
3. Intonation is Relative

1: Acoustics and Resonance

Basic Acoustics

Sound is a vibration that travels through a medium (usually air)

Waves have interesting properties:

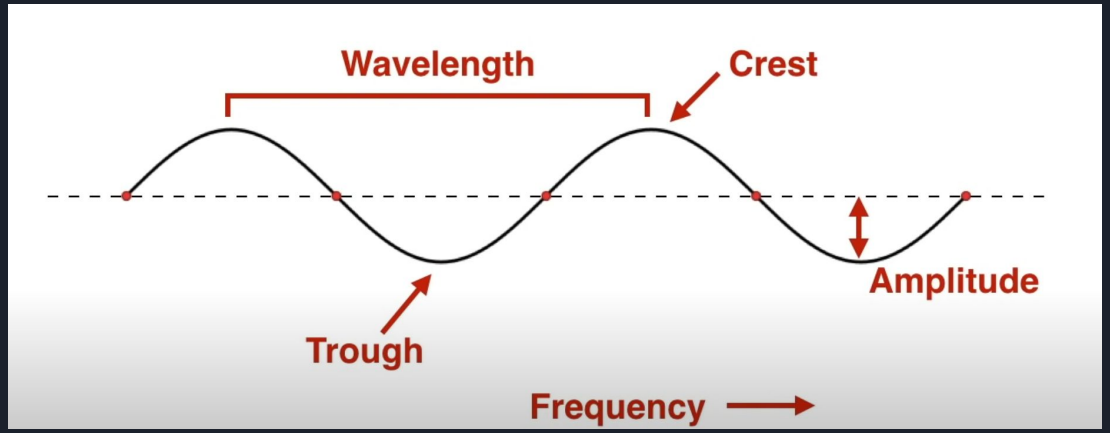


Image credit: Walk That Bass (YouTube)

Longitudinal Waves (Sound)

Visualizing them:

https://www.acs.psu.edu/drussell/demos/waves/wavemotion.html

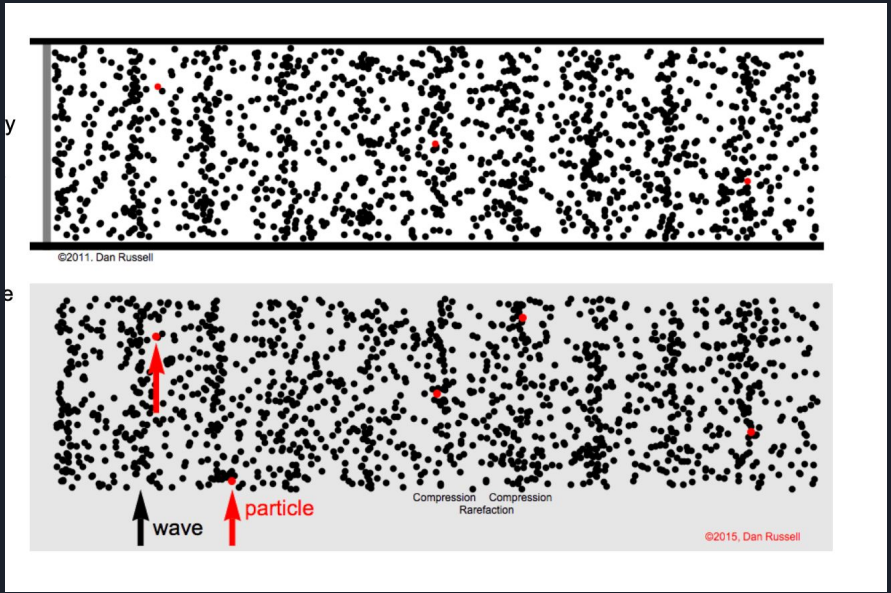


Image credit: Dan Russell

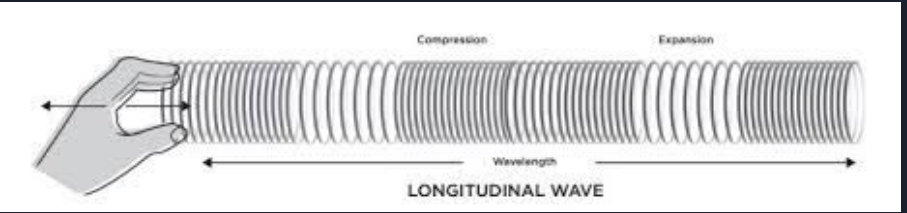


Image credit: Science World

Visualizing Sound Waves

HIgh point = air particles bunched together; low point = air particles spread apart

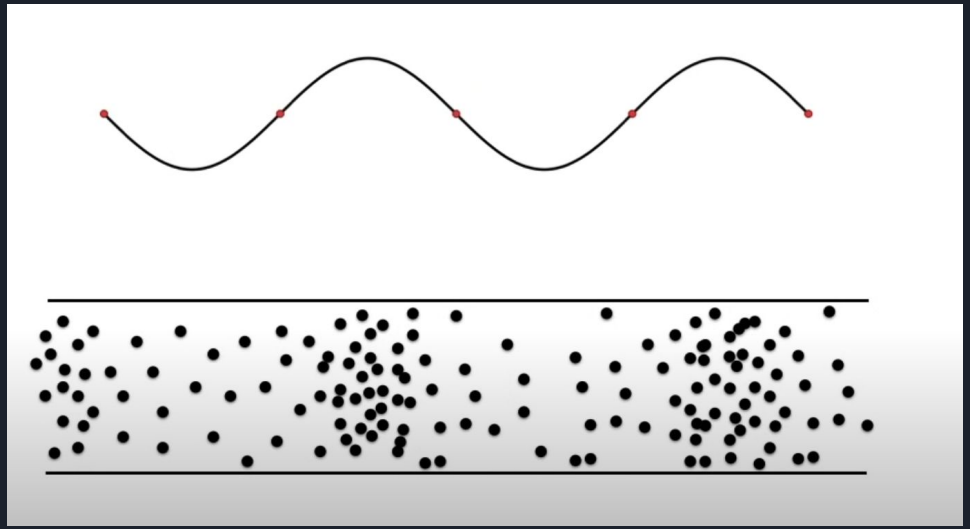


Image credit: Walk That Bass (YouTube)

Properties of Sound Waves

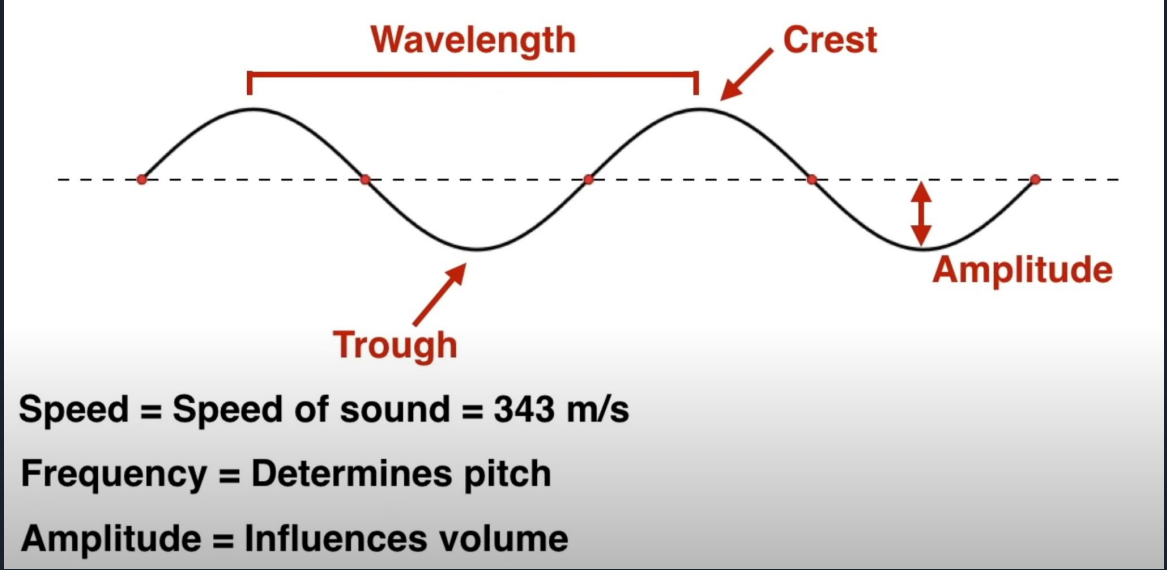
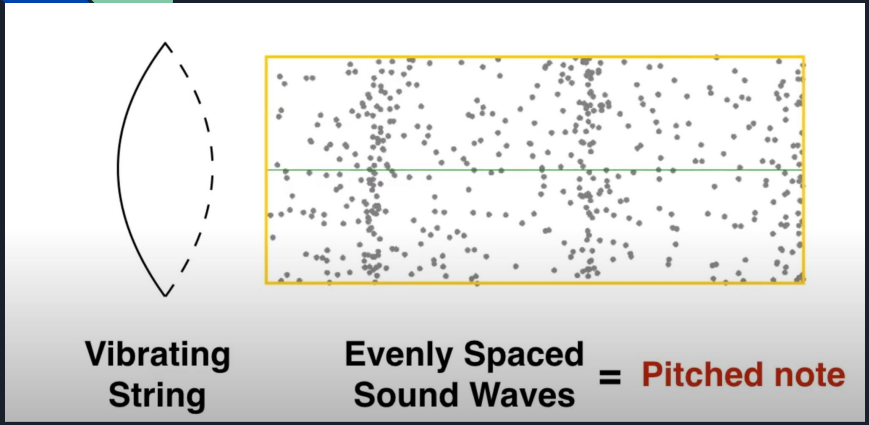
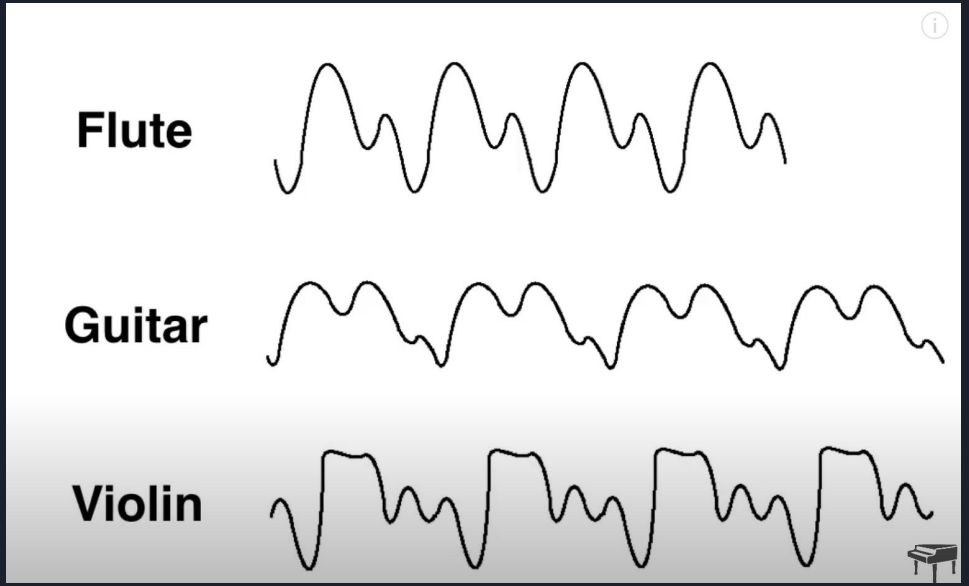


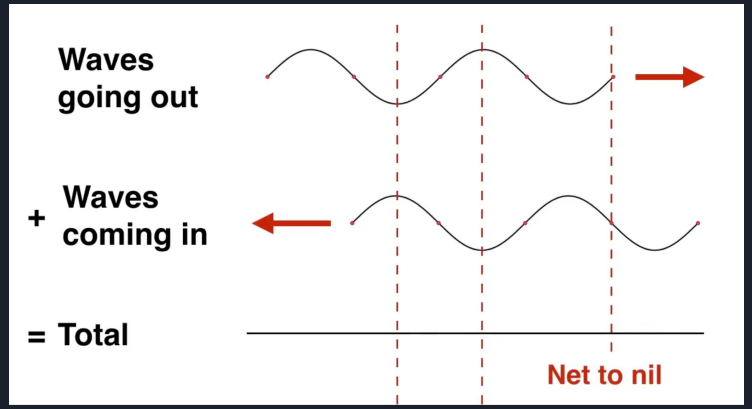
Image credit: Walk That Bass (YouTube)

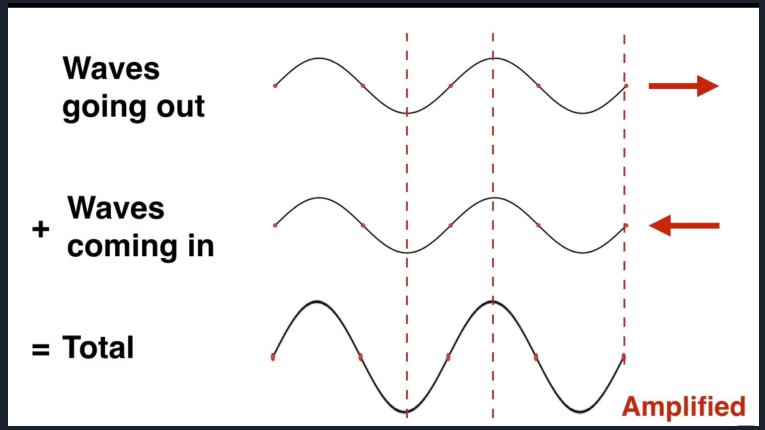
Note vs. noise





Standing Wave





Resonance

The “natural frequency” of an object

If you push a swing at the right frequency, it moves higher

This is the “resonant frequency” of the swing

How often do I drop rocks in the water bucket to amplify the wave?

A small amount of effort, repeated at an object’s natural frequency, amplifies the effect

Efficiency through Resonant Intonation

By Mark Van Cleave

The Idea of playing efficiently is one of the most sought after skills that seems to elude brass players. The whole idea of not having to work hard to produce the results you want is pervasive in every part of our society. How can I get what I want without working for it! …..or at least working as little as possible. When it comes to playing a brass instrument, the idea of how to get the best sound per grunt ratio is very important, being able to play well without paying a high price physically.

So, back to the title: Efficiency through Resonant Intonation. What is Resonant Intonation? Intonation is the player's ability to match the pitch of his/her instrument to the pitch of the instruments around them. Resonance refers to the acoustical phenomenon that occurs when the resonant frequency of an object or space (in this case: the volume of air inside the instrument) is stimulated. Resonant Intonation refers to the act of playing in tune with your instruments resonant frequency. Matching the pitch you produce with the pitch that the instrument wants to produce (because of where you have it tuned.) I like to call this the Shower Effect.

Practical Advice (Van Cleave)

You can play in tune whether or not your instrument is tuned - we can BEND!!

“Even if all of the horns are (technically) in tune, there is little or no chance that they will actually play in tune unless the individual players can recognize when they are in tune to begin with. Good intonation resides in the players own ears, not in the default tuning of the instrument!”

Lipping a note UP is inefficient because you’re working very hard to get the note in tune

Trumpets are fairly consistent -> they all play at about the same tuning slide setting

If your tuning slide set up is extremely far in or out, there’s a good chance you are not playing into the instrument’s natural resonance

First, adjust your tuning slide to a normal position (about 1 inch out) and then adjust your pitch to the horn

Popping the Mouthpiece

Flick the mouthpiece with your finger and listen to the pitch that's generated

This is the pitch the instrument WANTS to produce - it's the one that will be the most resonant and give you the biggest sound for the least work

Read the rest of the article on your own

https://allthingstrumpet.com/efficiency-through-resonant-intonation

So, to sum all of this up: You can tune your instrument, you can tune your ears, and you can tune your ears to your instrument. When you are producing the pitch that your instrument has been tuned for, you gain resonance as well as ease of operation or efficiency. Playing in tune with your instrument is what I'm talking about. You should tune your horn to the ensemble and yourself to the horn.

Oral Cavity Resonance

Resonant Oral Cavity: While playing the first note in the exercise below (G), open and close your teeth slightly. A “WA – WA” sound or movement. You will hear that as the teeth are closing, the sound changes to a tighter, pinched sound. As you open the teeth, the sound becomes thin. You will also notice that somewhere in the middle, the sound jumps out of the horn. You have just matched the resonant properties of your oral cavity with those of the horn. This is the point of greatest resonance.

We do make oral cavity adjustments for every single note!

Try this doing long tones: listen for the center, listen for tone color

2: Practice Exercises

In-TONE-ation

- Intonation is not ONLY playing in tune
- Playing “in TONE” -> centered resonant sound across all registers
  - Playing where the horn wants to resonate
  - Resonant oral cavity

A few practice exercises to recommend:

- Do these without a tuner: focus on listening and remaining aware of the sensation in your body. Am I applying tension? Squeezing? Lipping up or down? Is my instrument and body resonating?
- Then, once this answer is yes, we can start using drones and tuners.
- The way we make adjustments is very important.

Build the muscle memory of playing in tune from the EARS, not the eyes

Micro-Adjustments

Subconscious microscopic changes our body makes when refining a movement

- Think of training free-throws in basketball

Led by our ears: often **not conscious**

Focus on intended outcome and bodily awareness / don't over-correct

Set intention and let the body do the work

Certain "trouble notes" require VERY conscious fix: alternate fingering or slide use or just lipping down

We don't need to make them all the time

Don't get distracted by micro-adjustments

Bends

A way to find the center of our slot

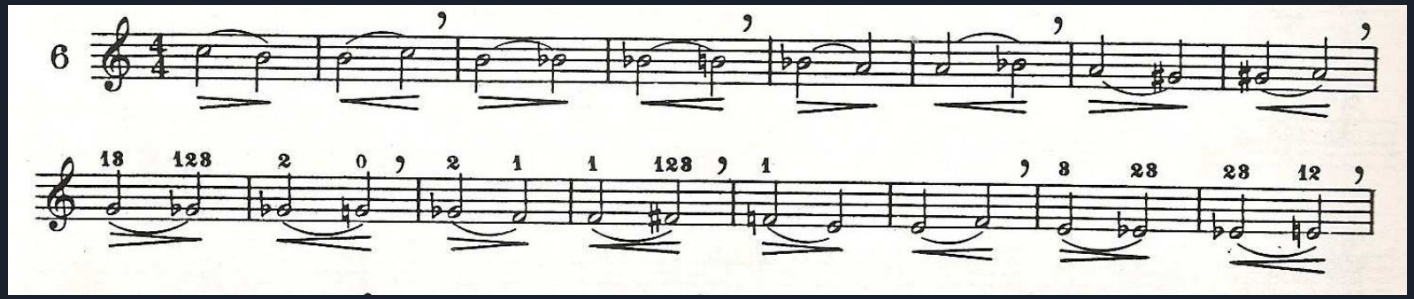
Opening/relaxing the chops slightly/loosening your grip on the note

When we bend down, we undershoot and over-relax

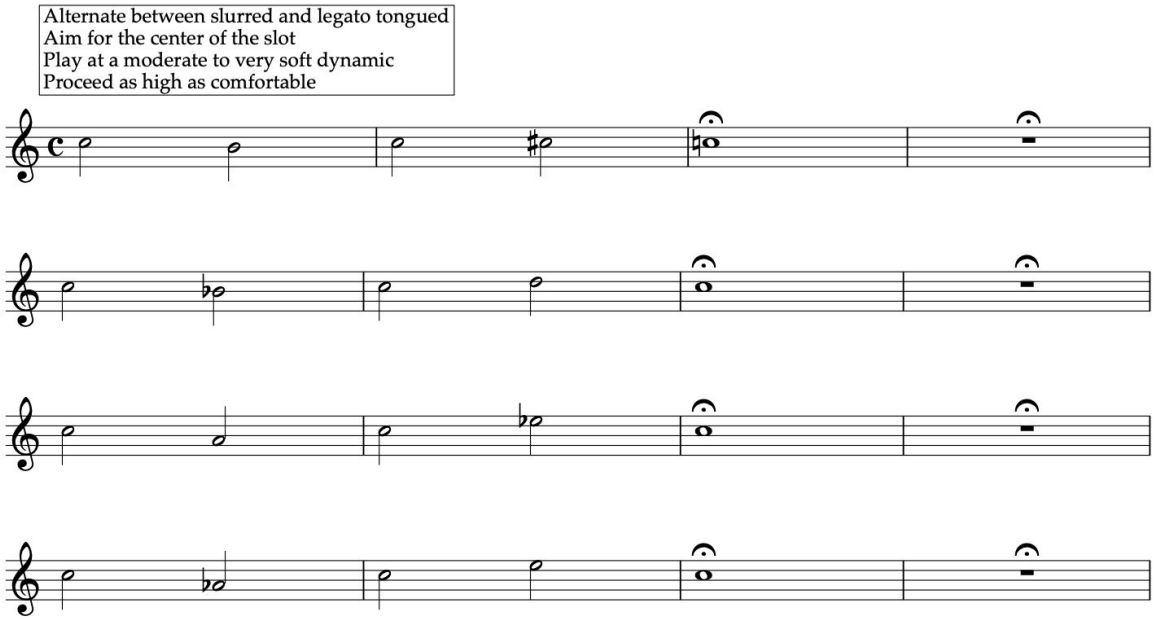
Then bend back up until the note SNAPS and rings

Check out Dan Rosenboom's book for a lot more on bends!

Ex: **Schlossberg 6 (with bend)**



Expanding intervals from C



The link to the full PDF is available by clicking “Join Discussion Thread” below!

Long Tones

Caruso, Arban, Schlossberg, Sachs, Adam are big ones - they all work!

“Free Walk on Firm Ground” article by Chris Gekker

Wynton: “seek the biggest tone at softest volume”

“Work as hard as possible, while staying as fresh as possible”

- Create an Intonation Chart
- Drones over tuners
- Rest!
- Playing soft well is a rare skill
- Van Cleave: Memorize the tone color and sensation of oral resonance

Practice Scales and Chords

A few minutes a day can help you learn to hear notes in relationship to a root note, and play better in tune

Cover your everyday range, play in all keys, quarter notes with a metronome, legato tongue

Start on bottom note, ascend, and then return

- Major, Natural minor, melodic minor, diminished 7th, whole tone, augmented, chromatics
- Dominant chords, with alterations, major and minor 7th chords, half diminished, pentatonics, etc

Etude Practice

See Chris Gekker's course on this

Lyrical etudes are good to start, but any can work: Concone, Bordogni, Caffarelli

Simple and slow, get your ears noticing pitch

Vizzutti practices 80% music but is deliberate about focusing on different skills!

Remember to rest!!! When you're tired, you'll surely go sharp

Ear Training

- You do NOT need perfect pitch!
- Mouthpiece practice
- Teoria.com or other apps/training sites
- Practice in hard keys
- Learning melodies by ear (jazz, popular songs, etc.)
- Transposition exercises
- Play trumpets in C and Eb when you’re able!

Endurance

You must first ask: “what are you preparing for?”

Physical adaptation to a specific task: there are different kinds of endurance

Trumpet is the most physically strenuous instrument!

Player self-reports are largely false: they rest a lot more than they report!

Rest more than you play: stay fresh

Notice how your intonation changes as you get tired – switch to a “backup” plan involving more alternate fingerings

Back off - don’t push harder

3: Intonation is Relative

Intonation is Relative

The tuning of note depends on the harmonic and performance environment

- Know the chord
- Know the ensemble
- Understand just temperament vs. equal
- More important to listen to the group than to be “right”

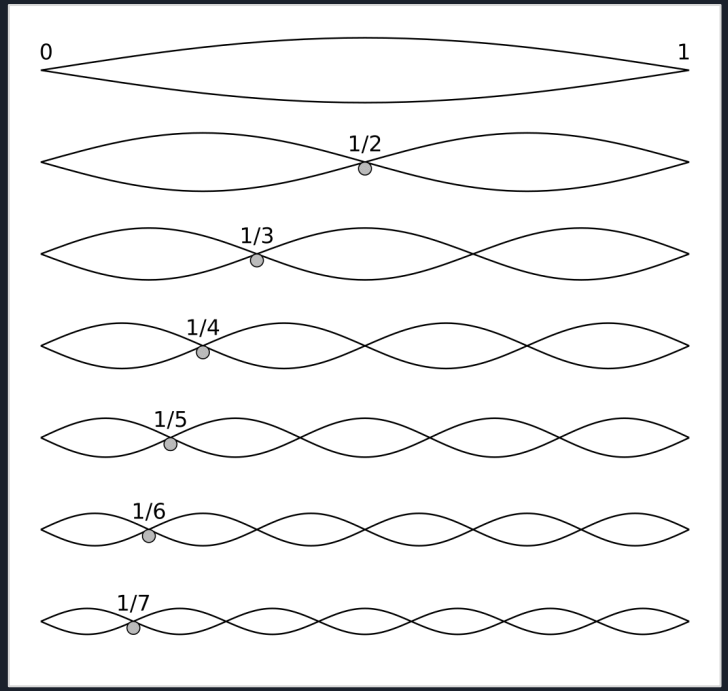
Soloists tend to play on the higher side for added brilliance

Develop familiarity with alternate fingerings

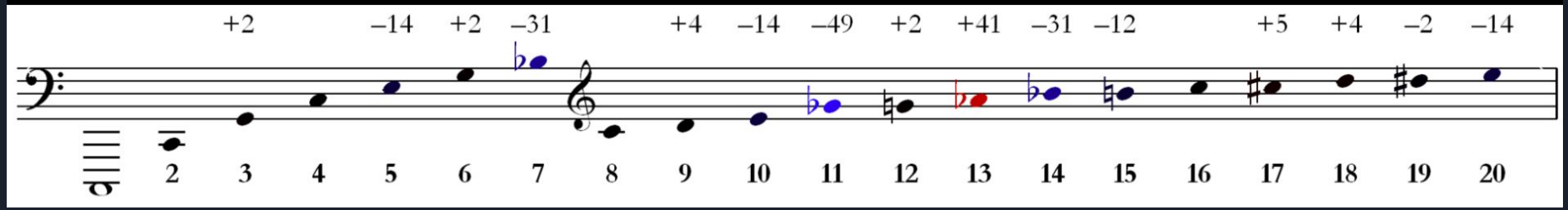
Note how temperature changes during extreme heat and cold

Intonation can sometimes be an expressive device/isn’t a deal-breaker:

https://www.youtube.com/watch?v=AtT_JQ_bQ7g

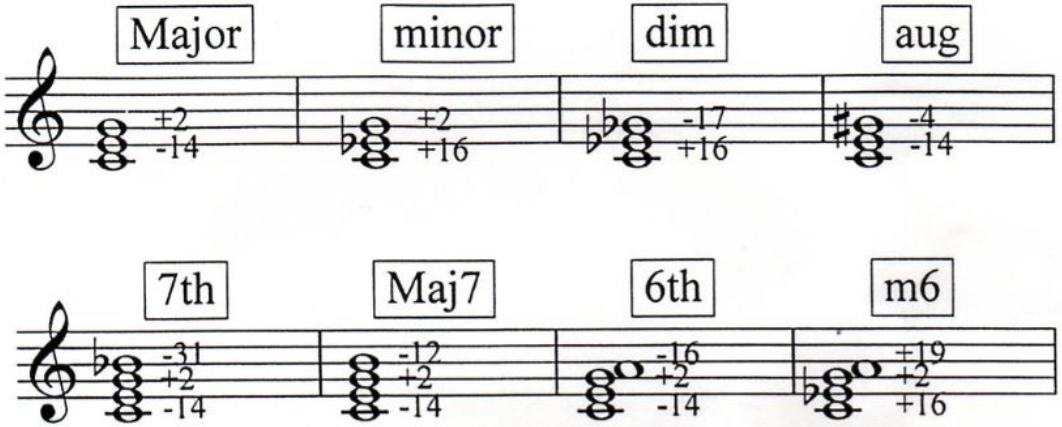


Imgs:
Wikipedia



Common Chords of Just Intonation

All chords are based on the root "C" which is "0" pitch.



Common Just Intervals

and their adjustments from Equal Temperament

Interval	Minor 2nd	Major 2nd	Minor 3rd	Major 3rd	Perfect 4th	Aug 4th	Dim 5th
Cents from ET	+ 12	+ 4	+ 16	- 14	- 2	+ 17	- 17

Interval	Perfect 5th	Minor 6th	Major 6th	Minor 7th	Major 7th	Dom. 7th	Unison
Cents from ET	+ 2	+ 14	- 16	+ 18	- 12	- 31	+/- 0

Img: UNC Greensboro

SUMMARY

- Think about resonance: how can I play first get myself and my ears in tune with my instrument, and my instrument in tune with the ensemble or context I’m in

- Use tuners and drones as tools to help build control – always tune with your ears, not your eyes

- There are an abundance of exercises we can work on daily to improve our intonation. Just don’t overcorrect!