SOUNDMAPS
A Road Map to Fingerboard Geography

by Carolyn Mead

Do your students get confused about scale fingerings? Do some of them think A♭ is played on the A string? Do they have trouble understanding key signatures and accidentals? Do you have students who identify all notes as fingerings? Do your students understand positions on the A string but not on the G string?

Fingerboard geography is complex. Where are the notes? How do you know if you are in tune? Is there a pattern to the fingerboard? Because of these difficulties, I experimented with fingerboard diagrams and designed a series of fingerboard maps to help students and parents visualize the layout of the fingerboard. Using these maps, my students are able to remember fingerings more easily and sight read with fewer errors. Here's how the maps work.

Map Design

Each map illustrates one octave and fits on an 11-inch x 17-inch cookie sheet. Students "fill in the charts" using magnets that stick to the chart on the cookie sheet. There are three colors of magnets:

Red — for note names (A, B, C, sharps, flats, etc.) in the key and open strings

Yellow — for note names not in a key signature (accidentals)

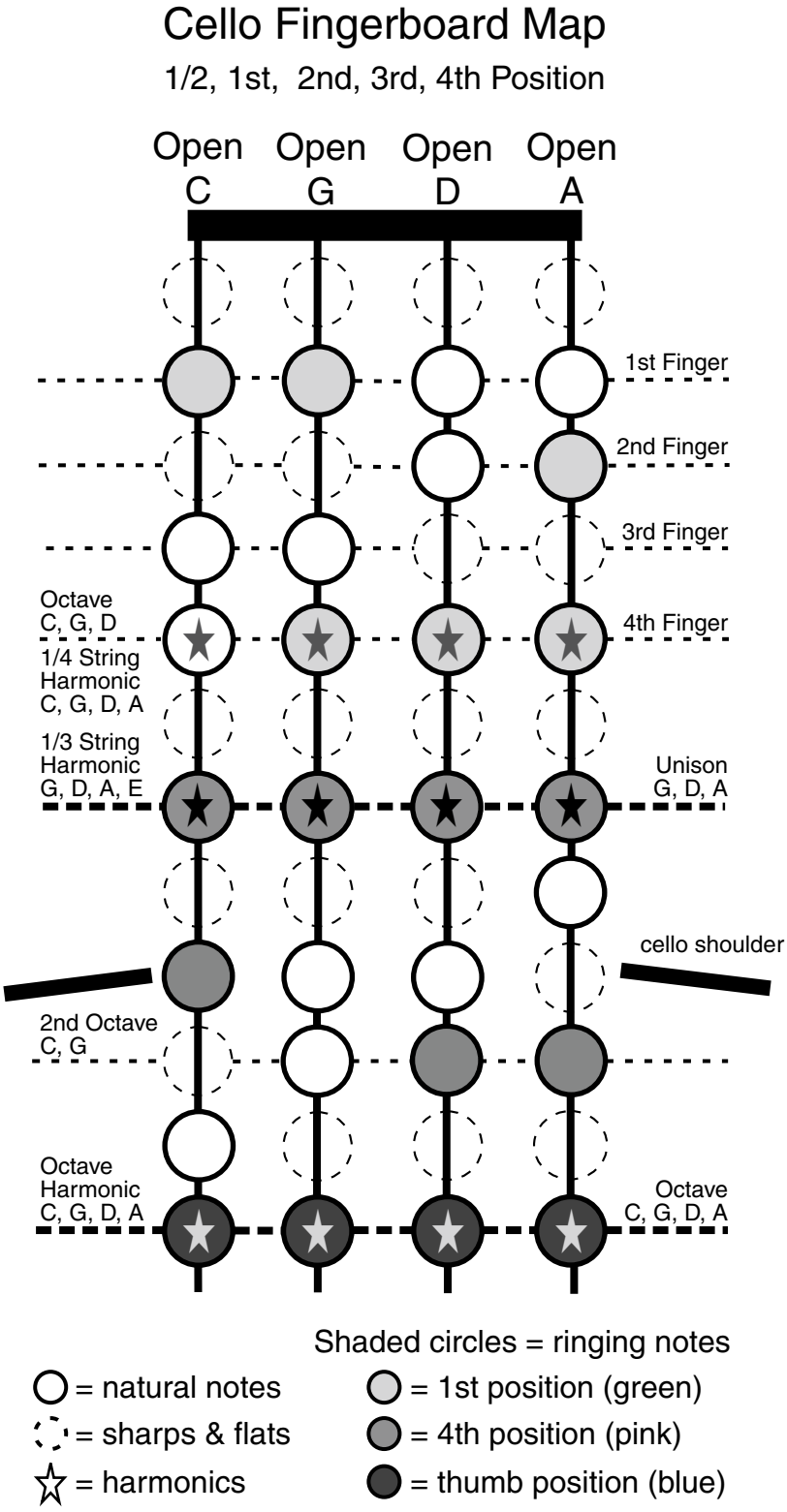
Blue — for fingerings (0, 1, 2, 3, 4, 0 (thumb for cello and bass))

Yellow — magnets with "X" for backward and forward cello extensions

The series of octave maps for each instrument are sequenced to gradually introduce "geographic features" on the fingerboard. The first map, for beginners, indicates the notes in the common first position fingering pattern plus the ½ and ⅓ harmonics. The maps for intermediate and advanced players indicate all chromatic notes within the octave shown. On each chromatic map, solid line circles indicate natural notes (white piano keys); dashed line circles indicate flats and sharps (black piano keys). The diagram shows the chromatic cello chart from open A to the ½ string harmonic. The sequence of maps is in the sidebar.

Color Coding

The piano keyboard is organized by easily recognizable groups of white keys and black keys that repeat in each octave of the keyboard. Similarly, the fingerboard is organized according to the repeating pattern of harmonics and "ringing notes" (notes that have the same letter name as open strings). A color-coding scheme for harmonics and ringing notes highlights note location, pitch relationships and the design of the fingerboard. Mapping harmonics and ringing notes along the entire



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fingerboard reveals the "sound map" or resonance pattern of the instrument.

The strings are divided into octave segments using the ½, ⅓, ¼, and ⅙ string harmonics. Each harmonic is identified with a star and labeled by name. The ½ and ¼ string harmonics have blue stars; the ⅓ and ⅙ string harmonics have red stars.

On each map, ringing notes are color coded because they create strong resonance when played in tune and are used for checking intonation with an open string. For violin and viola, ringing notes are color-coded by the octave range: open string to ½ string harmonic — green; ½ string to high ¼ string harmonic — blue; high ⅓ string to ⅙ string harmonic — yellow. For cello and bass, ringing notes are color-coded according to the ⅓ string harmonic in 4th position as well as the ½ string harmonic to emphasize the importance of the ⅓ harmonic in tuning: open string to ⅓ harmonic in 4th position — green; ⅓ harmonic in 4th position to ½ string harmonic — pink; ½ string to high ⅓ string harmonic — blue; high ⅓ string to ⅙ string harmonic — yellow. For all instruments, the harmonics are also ringing notes; they have a color and a star.

Color-coding of each string segment is identical from chart to chart for easy recognition and to help students stay oriented when moving from map to map. For example, the pink of 4th position and the blue of the ½ string harmonic are the same on the *1/2–5th Position* cello map as on the *4th–7th and Thumb* cello map.

The Mapping Process — Watching Students Think

My cello students begin using the maps during the first year of study. Harmonics are the primary landmarks. These friendly fixed pitches located at the same point on each string are ideal for exploring the fingerboard. Initially, students play the harmonic and name it, and I place the red alphabet magnet on the map to show how the map works. Subsequently, the students arrange the magnets.

Next, we find ringing notes (all As, Ds, Gs, and Cs) in first position. These notes create sympathetic vibrations with the open strings when played in tune. Listening for resonance (ringing sound) and watching the sympathetic vibration reinforces accurate intonation.

Beginning students write (map) scale fingerings first (blue magnets), and then change each fingering to a note name (red magnets). The process is interchangeable. My goal is to start with the system that the student understands, and then develop fluency using both fingerings and note names. For example, students might play a 2-octave D major scale, and then arrange the magnets. The process is fascinating. They talk to themselves, finger on their arms, play the cello, and move the magnets around. I observe quietly, offer support but not answers, and say as little as possible. I do not interfere if there are mistakes. The students think independently, making decisions based on their own understanding and logic. Mistakes indicate missing information or faulty logic. When the scale is complete we go through the following checklist. With each step, the students make necessary corrections.

- Make sure every scale starts and ends on its name. (D-D)
- Make sure all notes are in alphabetical order. (D-E-F♯ etc.)
- Make sure notes with the same letter name (in different octaves) always match. (e.g. D-D, E-E, etc. F♯ and F do not match)
- Identify finger patterns and/or half steps. (Cellists use a yellow

SOUND MAP Sequence

Violin and Viola

1st position for beginners: 1-2^3-4 (high 2 pattern) only, plus the ½ string harmonic

1st position: all chromatic notes in 1st position, plus the ½ string harmonic

1st–5th position: all chromatic notes from open string to ½ step above the octave harmonic. (i.e. from open E to F on the E string)

4th–7th position: all chromatic notes from the 4th position ⅓ string harmonic to the high ⅓ harmonic; (i.e. from B to high B on the E string)

Cello

1st position for beginners: 1-3-4 finger pattern only, plus the ⅓ (4th position) and ½ string harmonics

½–5th position: all chromatic notes from open string to ½ string harmonic

4th–7th and thumb position: all chromatic notes from the 4th position ⅓ string harmonic to the high ⅓ string harmonic (i.e., from E to treble E on the A string)

Thumb position 1: all chromatic notes from the ½ string to ¼ string harmonic (i.e. from octave A to double octave A on the A string)

Thumb position 2: all chromatic notes from the high ⅓ string to ⅙ string harmonic (i.e., from treble E to E near the end of the fingerboard on the A string)

Bass

1st and 2nd position for beginners: 1-2-4 finger pattern, plus the ⅓ (4th position) and ½ string harmonics

½–3rd position: all chromatic notes from open to the ⅓ harmonic, plus the ½ string harmonic

½–6th position: all chromatic notes from open string to the ½ string harmonic

4th–7th and thumb position: all chromatic notes from the 4th position ⅓ string harmonic to the high ⅓ string harmonic. (i.e., from D to D on the G string)

Thumb position 1: all chromatic notes from the ½ string to the ¼ string harmonic (i.e., from octave G to double octave G on the G string)

Thumb position 2: all chromatic notes from the high ⅓ string to the ⅙ string harmonic (i.e., from treble D to D near the end of the fingerboard on the G string)

Thumb position 3: all chromatic notes from the ¼ string to the ⅛ string harmonic (i.e., from double octave G to triple octave G on the G string)

For more information about purchasing SOUND MAPS for your studio or classroom contact Carolyn Mead, 421 15th St. NE, Rochester, MN 55906, 507- 292-5975, cmead@rconnect.com.

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"X" magnet to indicate forward and backward extensions.)
- Check ringing notes.
- Play the scale. Does the mapped fingering match what is played?
- Change note names to fingering and vice versa.

Mapping a Key Signature; Positions; Shifting

Understanding key signatures and accidentals and relating them to fingering is a mystery for many students. A key signature is a set of notes, like a math set, or a set of ingredients for a recipe. The key signature printed in the music identifies only the sharps or flats. The remaining natural notes in the set (A, B, etc.) are implied. Mapping the complete set of notes helps clarify this point. For example the printed key signature for D Major is F♯ and C♯. The complete key signature is A, B, C♯, D, E, F♯, G. Mapping the key signature (e.g. DM) identifies all As, Bs, C♯s, Ds, Es, F♯s, and Gs, including open strings, that can be used in first position on all strings in D Major. We add the yellow letter-name magnets for accidentals. The color change emphasizes the fact that the accidental (e.g. F♮) is not part of the key signature. Mapping key signatures by fingerings helps students see the fingering patterns and half steps on each string. Yellow "X" magnets indicate the backward and forward extensions on the cello.

Mapping key changes helps students remember key signatures and improves sight-reading. For example, a student can set up D Major on the map, and then change it to A Major. The difference between the two keys is G♯; all other notes stay the same. Moving from sharp keys to flat keys involves more changes. We add yellow accidentals to the map and place fingerings (1, 2, 3, 4) beside the C string to show where the patterns change with each key. Seeing these relationships organizes thinking. I use the same process to teach (map) each position and to work out difficult passages or shifts in an etude or piece.

Mapping Whole and Half Steps

Whole steps and half steps are easy to see on the piano; visualizing the same pattern the fingerboard is more complicated. Piano pitch moves from left to right; string players can't see the notes, and we change pitch in two directions: up and down on one string, and across strings. Fingerings change from string to string. The complete sequence A-B-C-D-E-F-G is broken up by the string change and the open string (not a fingered note, therefore not felt in the hand). To clarify this, I map A, B, C, D, E, F, G on the G string to show the complete one octave sequence on one string. The half steps B-C and E-F are easy to see. Next I map one octave on the C, D, and A strings, starting with first finger. The half steps are always the same. Finely, I map all of the natural notes in first position moving across strings. The same process works for other keys.

Benefits of Mapping

Fingerboard geography is complex. String players discover the secrets of the fingerboard as they learn to play the instrument, guided by the ear, the hands, and the muscles rather than the eye. Variable pitch and variable distance between notes makes the process more difficult. It's not surprising that students get confused.

I have used the fingerboard maps for six years with students from age 3-½ to adult, in the private studio and in the classroom, with and without the piano. Students like the color and the challenge of solving the puzzle. Parents appreciate seeing the fingerboard layout. The mapping process encourages students to be aware of what they actually play. They answer many of their own questions and therefore understand and remember. Using the hands to arrange magnets (rather than a mouse on a computer) integrates intuitive understanding of playing the cello with thinking. As a teacher, I can observe each student thinking and problem solving. Mapping gives me a clear picture of what my students know.

Carolyn Mead teaches cello in her private studio in Rochester, MN, and is assistant principal cello in the Rochester Orchestra and La Crosse Symphony. This summer she was on the faculty of the Atlanta Suzuki Institute and the American Suzuki Institute (Stevens Point WI). Before coming to Minnesota, Carolyn taught strings and orchestra in the public schools in Nebraska, Wyoming, and California.