GEOMETRY AND FINGERBOARD SHAPES:

Voice Leading in the Instrumental Space of the Violin

Leah Frederick • University of Michigan • *lnfreder@umich.edu*
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FIGURE 1

Fingerboard shapes in J. S. Bach's Violin Sonata in G minor, BWV 1001, I. Adagio, mm. 1–5. Each triple stop is identified with three labels: (1) *finger-string elements* indicate the "fret" placement of each finger on the strings; (2) the *fingerboard prime form* captures the overall chord shape on the violin's fingerboard; and (3) the *generic PT-class* captures the chord spacing in pitch space measured in generic intervals.

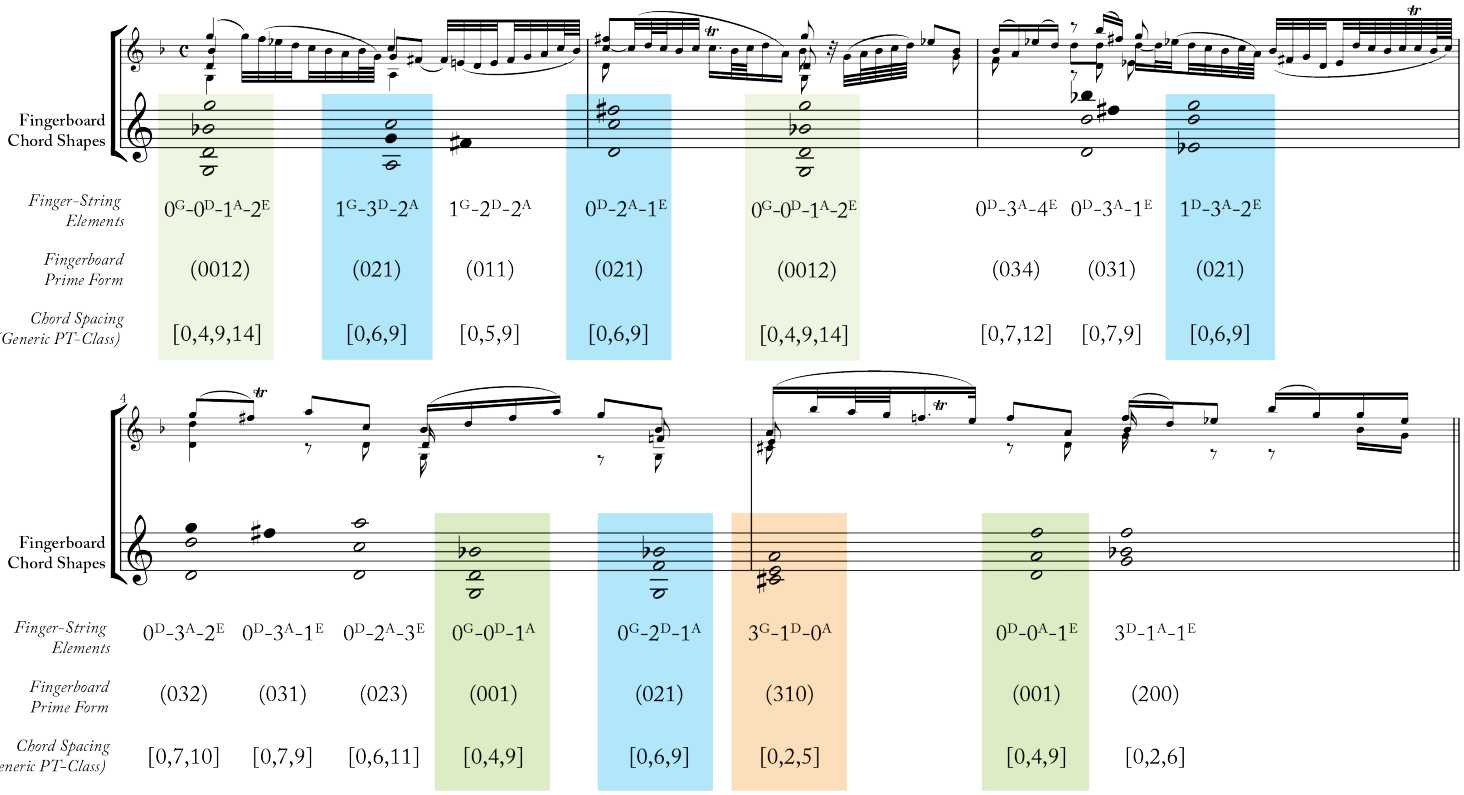
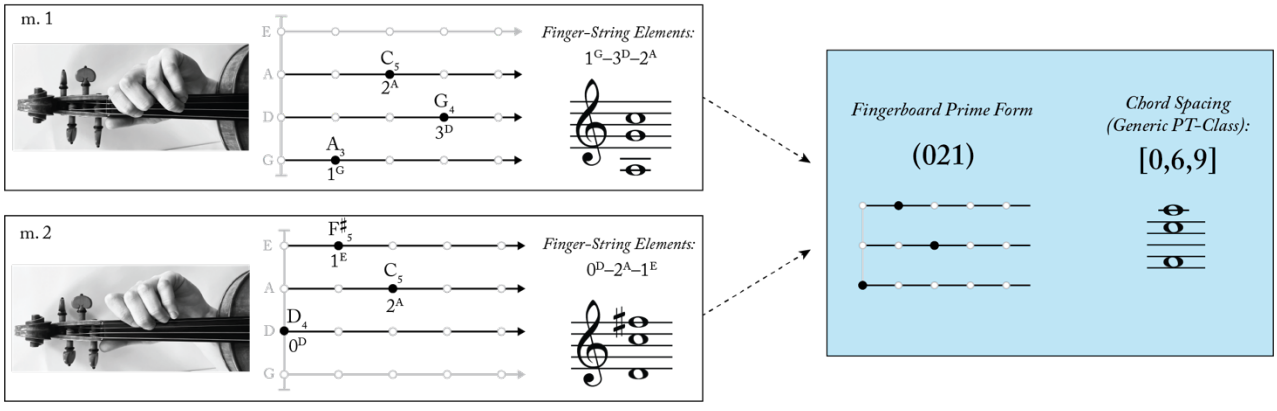


FIGURE 2

Two examples of chords (from Figure 1) belonging to fingerboard prime form (021). Each *fingerboard set class* (adapted from Koozin's [2011] *fret-interval type*) is an equivalence class containing all shapes related by along-string and across-string transposition. Since "fret" locations are measured in generic steps (after De Souza 2020), they usually correspond to the fingers used to play the chords; e.g., as shown below, the first chord (m. 1) is played with the first, third, and second fingers.



(Photo credit to Nancy Murphy)

FIGURE 3

A geometric space of chord spacings, the generic *PT*-space (after Frederick 2024a, fig. 17). Each point in this space represents a 3-note chord spacing (*PT*-equivalence class) measured in generic intervals.

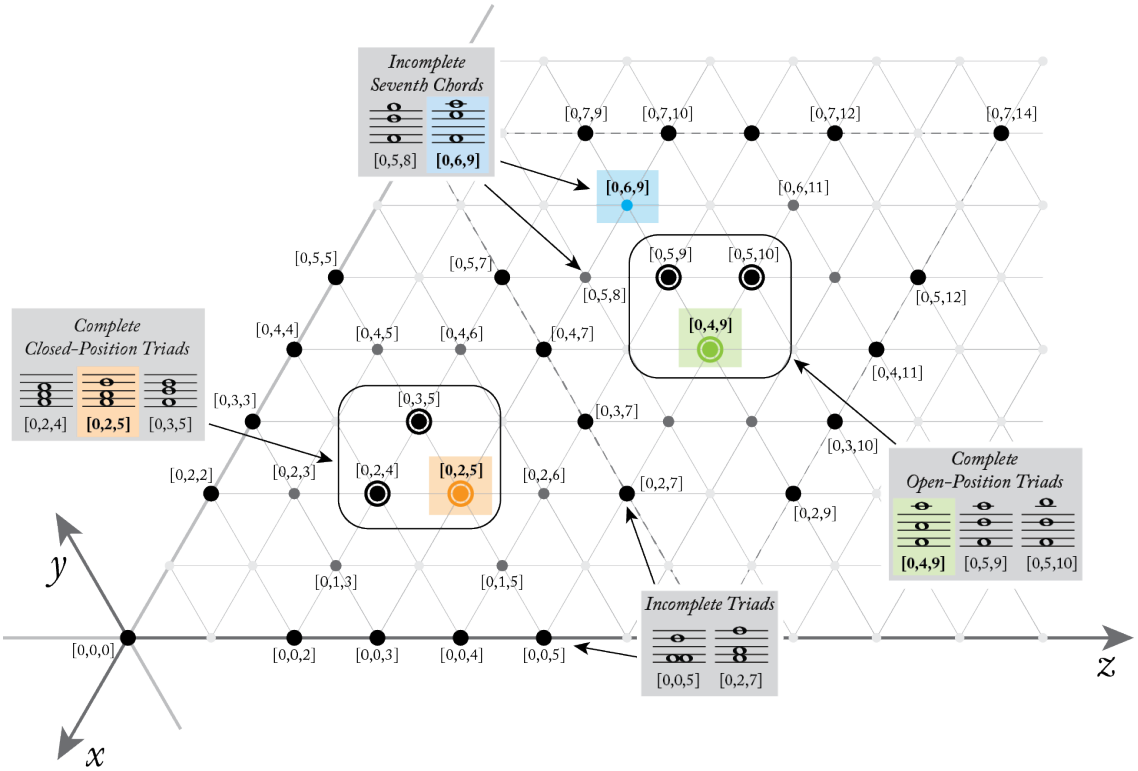


FIGURE 4

A geometric space of triple stop fingerboard set classes. Each point in this space represents a 3-note fingerboard set class. The space is topologically equivalent to a *T*-space; the portion of the space shown here includes all chords playable within a violinist's left-hand span.

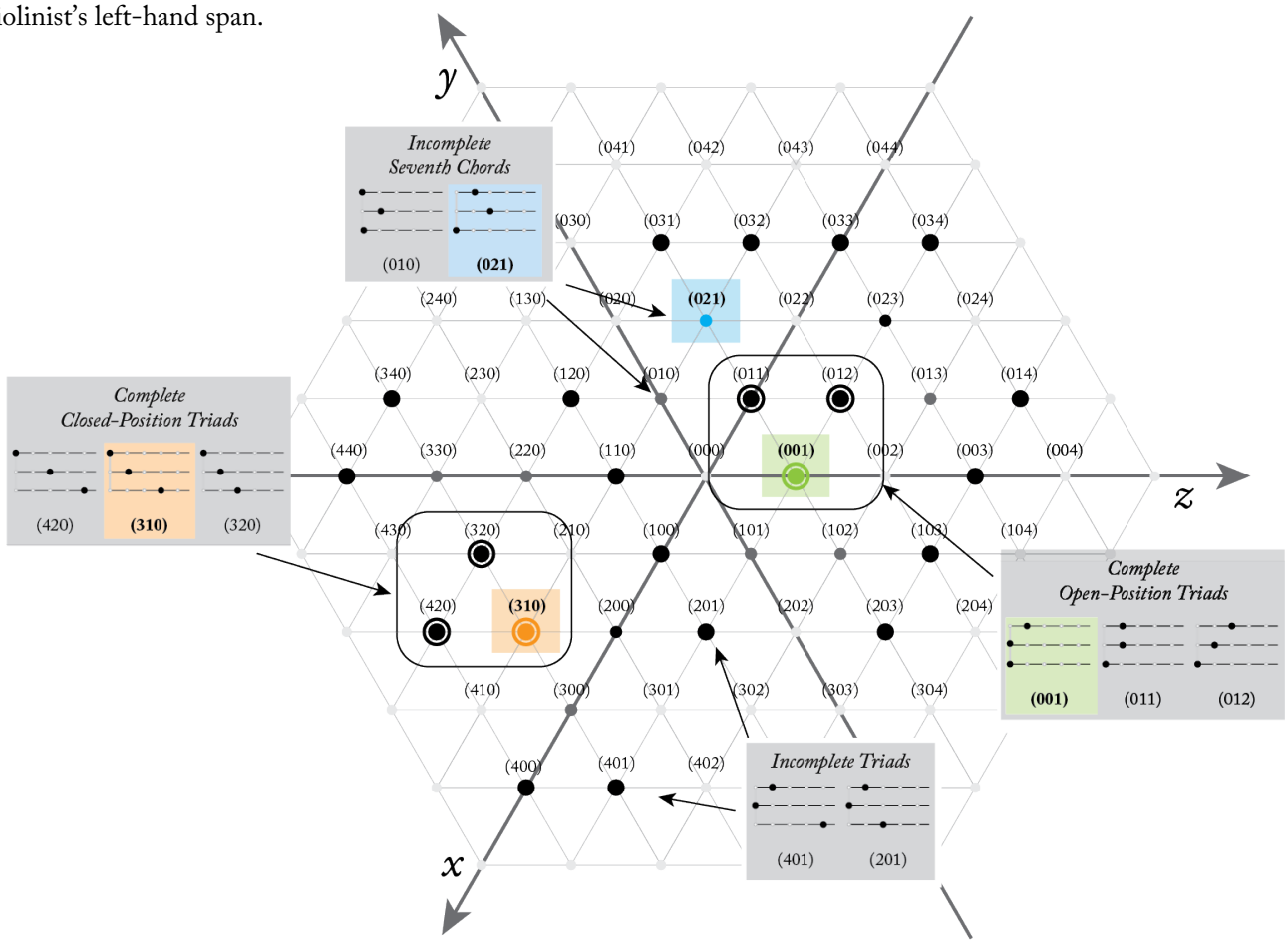


FIGURE 5

Analysis of fingerboard shapes in J. S. Bach's Violin Sonata in G minor, BWV 1001, I. Adagio; (a) Form diagram (after Lester 1999) emphasizing key relationships in the A and A′ sections; (b) side-by-side comparison of fingerboard shapes at the start of the A and A′ sections; and (c) generalized voice-leading relationships between fingerboard shapes shown using the fingerboard set-class space.

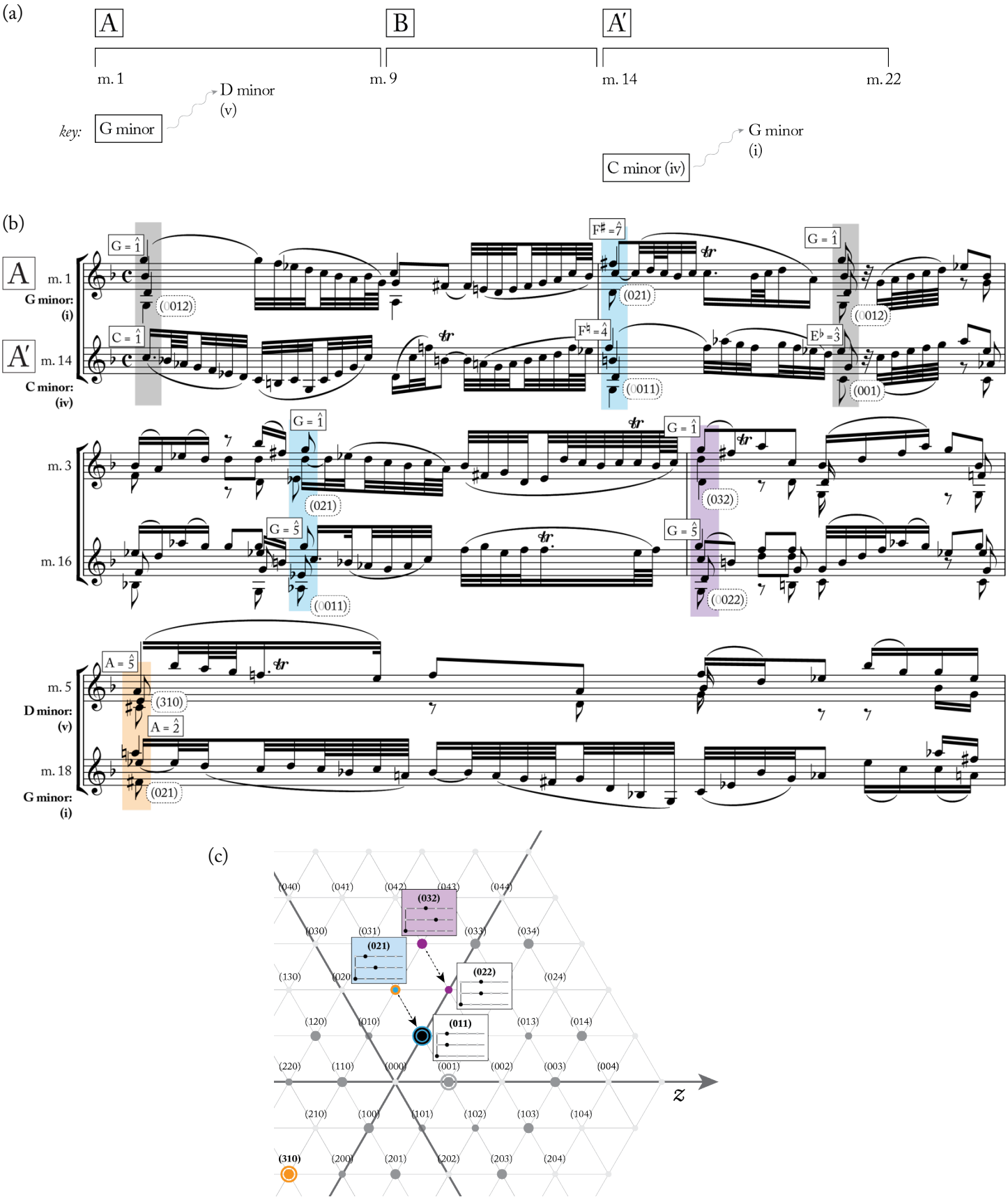


FIGURE 6

(a) Excerpt from Alfred Blatter's (1997, 45) instructions for writing playable multiple stops on string instruments; (b) calculation of the fingerboard prime form of the upper three notes of the example chords in Blatter's figures; and (c) the region of fingerboard set-class space containing chords that satisfy Blatter's description of those that are the most playable.

(a)

Making Multistops Playable

To facilitate triple or quadruple stops in which several stopped pitches are present, it is convenient to voice the chords so that each successive pitch, from the bottom to the top of the chord, is closer to the bridge than the previous pitch. This is illustrated in Figure 2.4. When voiced in this manner, the performer's first finger stops the lowest string while crossing above the nonsounding portions of the higher three strings.

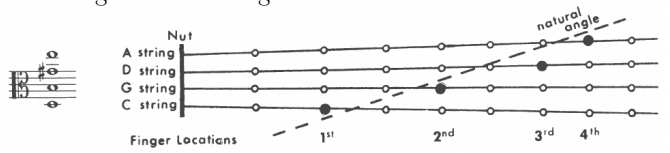


FIGURE 2.4. A naturally angled hand position—an easier hand position for multiple stops than Fig. 2.5

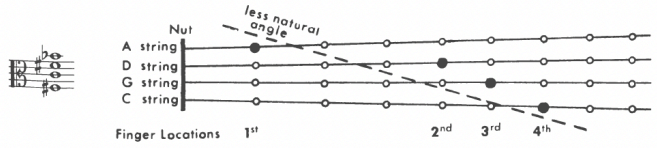
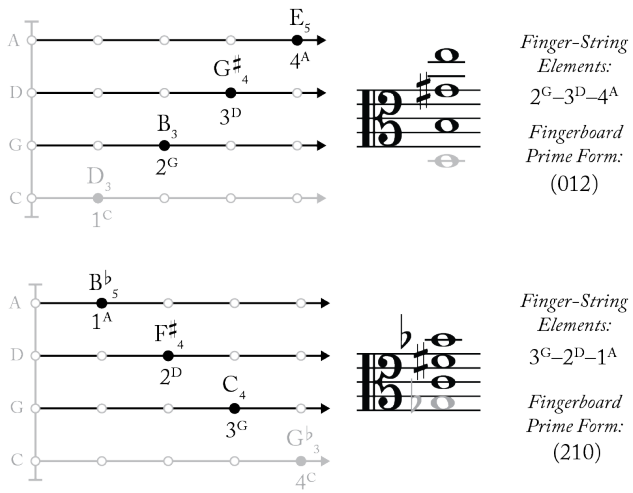
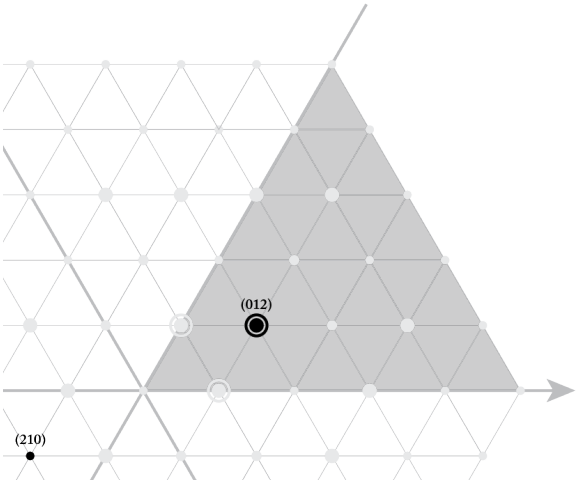


FIGURE 2.5. A less naturally angled hand position—not as easy for playing multiple stops as Fig. 2.4

(b)



(c)



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