

Choose Your Own Cadenza

Tonal Composition for Virtual Auditory Realms

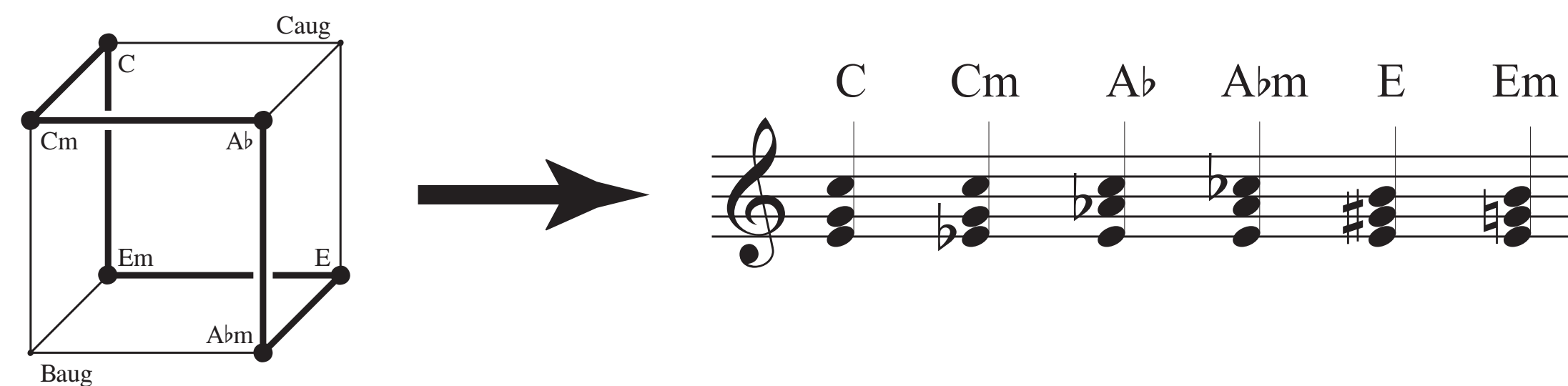
Bennett Samuel Lin, University of Washington

The challenge

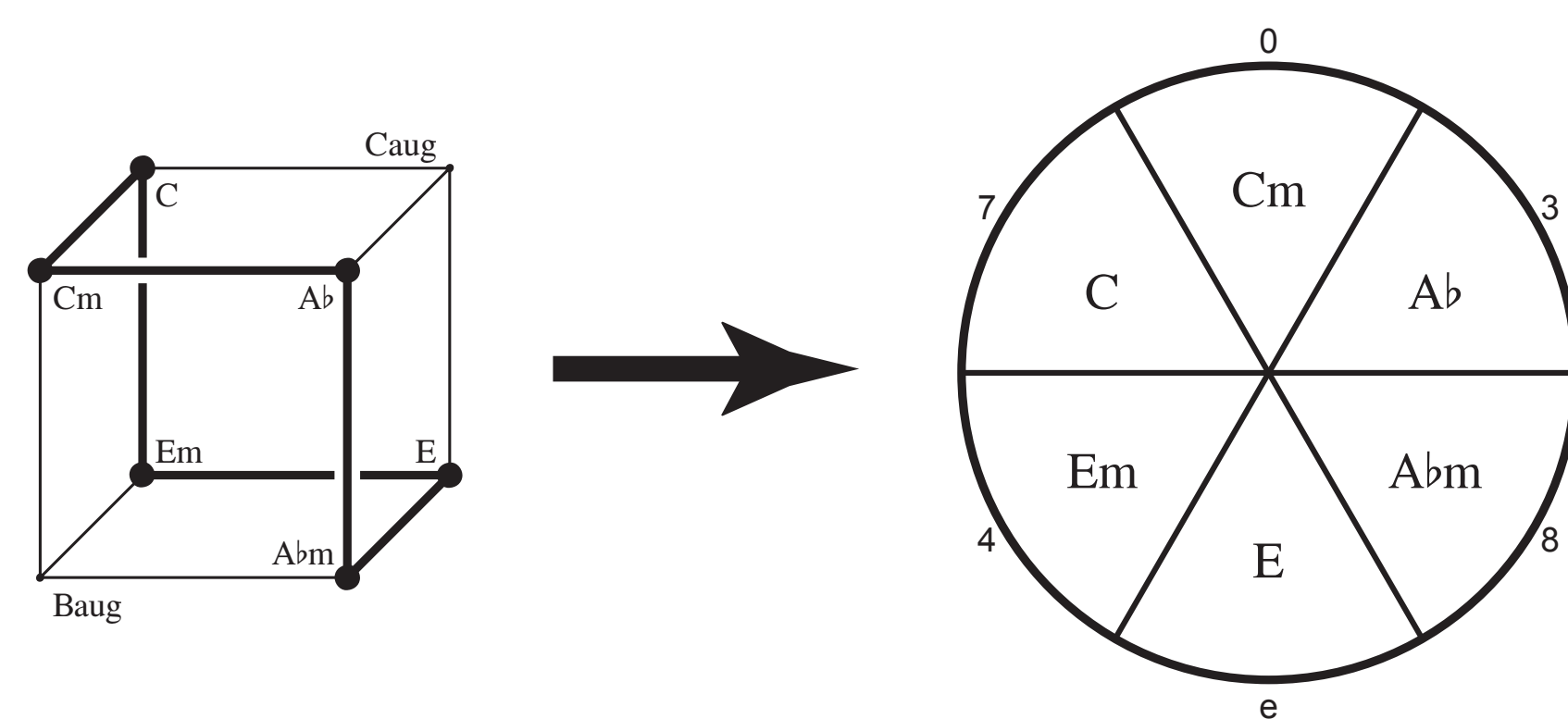
Our ears are naturally drawn to tonal music, yet its possibilities for new invention are finite and in danger of exhaustion. Modern technology provides an open-ended solution to this grim prospect by allowing tonal music to transcend its acoustic limitations. The challenge for 21st century composers, then, is to construct frameworks for tonal music to expand along temporal and spatial dimensions in ways previously unthinkable.

A proposal

Geometric models for voice leading are an exciting new field in music theory. While such models are typically used to plot the progression of harmonies over time, I propose that they may also be realized along spatial dimensions to create musical pieces set in virtual auditory realms. A single piece may then unfold in multiple ways depending on the location and movement of each listener. My poster demonstrates this concept using an example that I call the "hexagonal room."

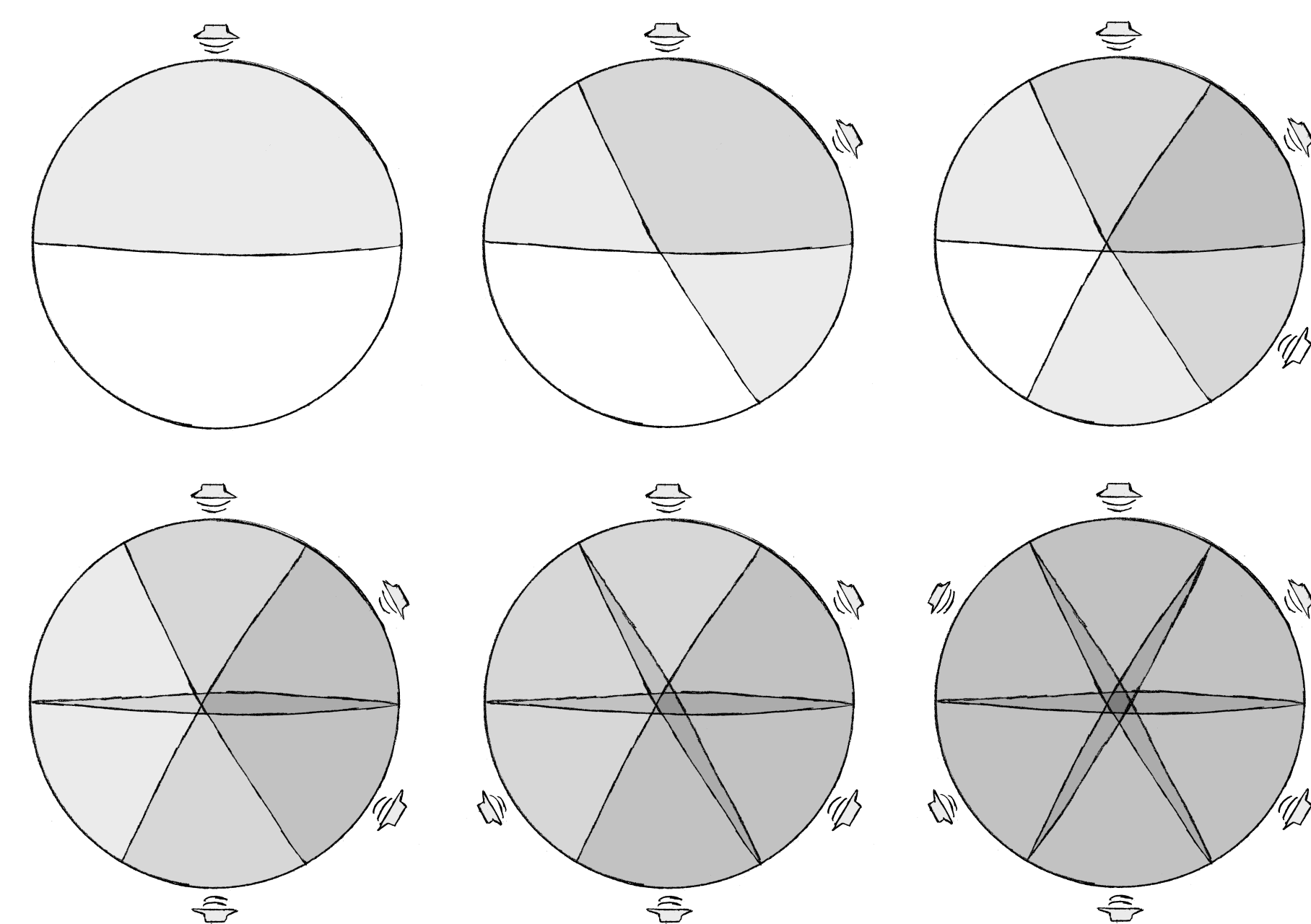


A path within the hexatonic cube is realized temporally. The resulting notation shown here represents a single location in physical space.



A closed path within the hexatonic cube is realized spatially. The resulting diagram shown here represents a single point in time.

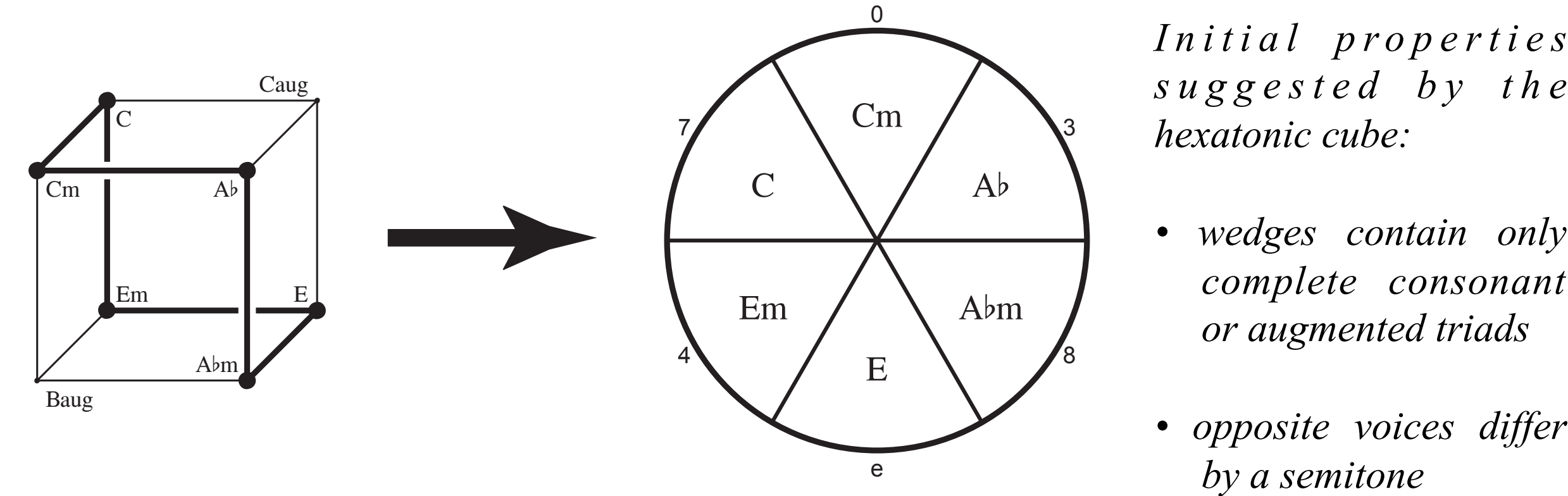
Layout of the hexagonal room



Six equidistant voices are placed along the periphery of the hexagonal room. Each voice is audible only within the half of the room to which it is closest. This divides the room into six wedges, in each of which can be heard only its closest three voices. (The sequential placement of each voice shown here is for visual clarity only.)

Mapping between geometric models and virtual realms

Any geometric model may be used to design the layout and sound properties of a virtual realm. In turn, exhausting the full potential of a virtual realm may require extending the geometric model.



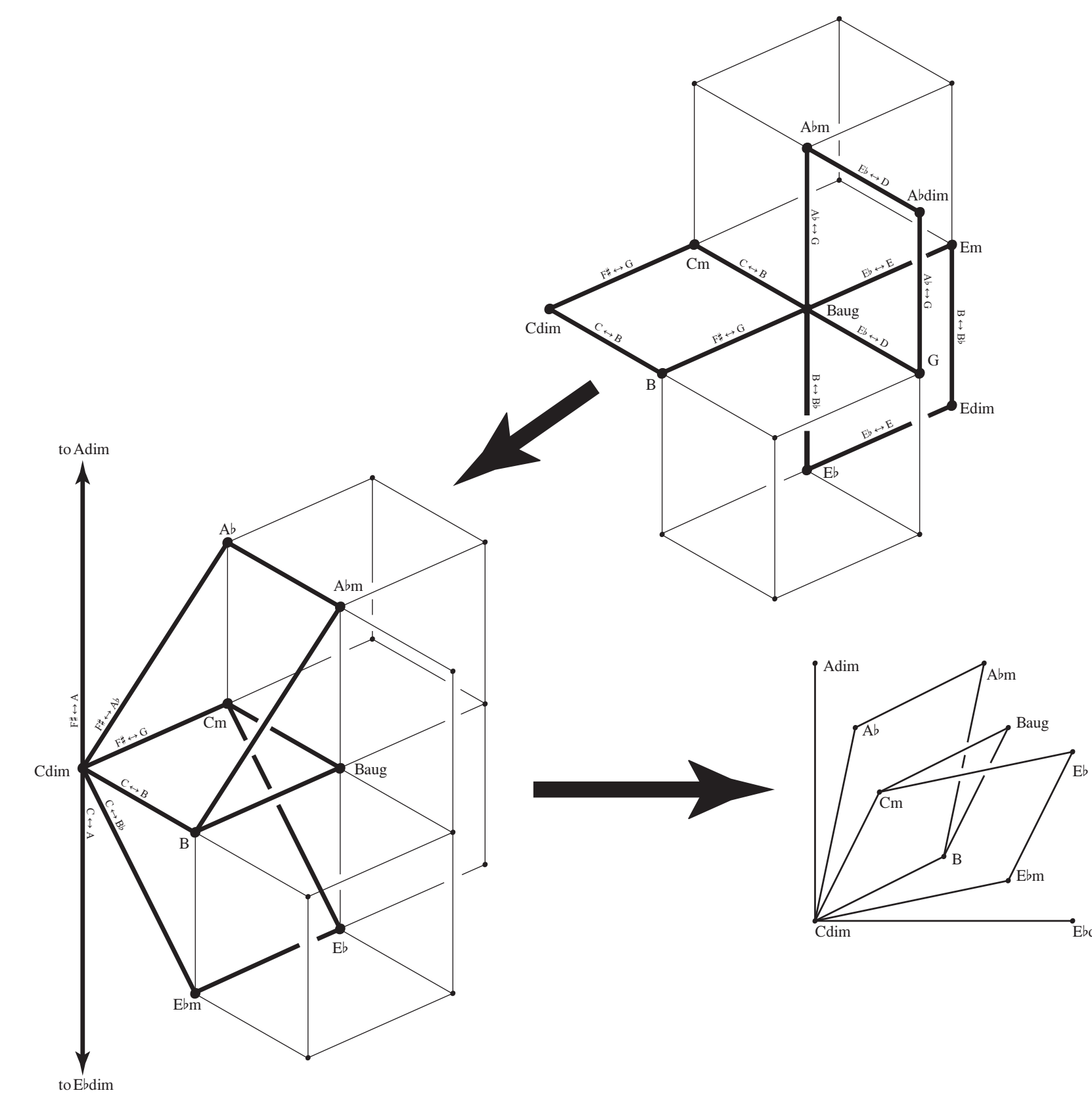
Initial properties suggested by the hexatonic cube:

- wedges contain only complete consonant or augmented triads
- opposite voices differ by a semitone

Extended properties suggested by the hexagonal room:

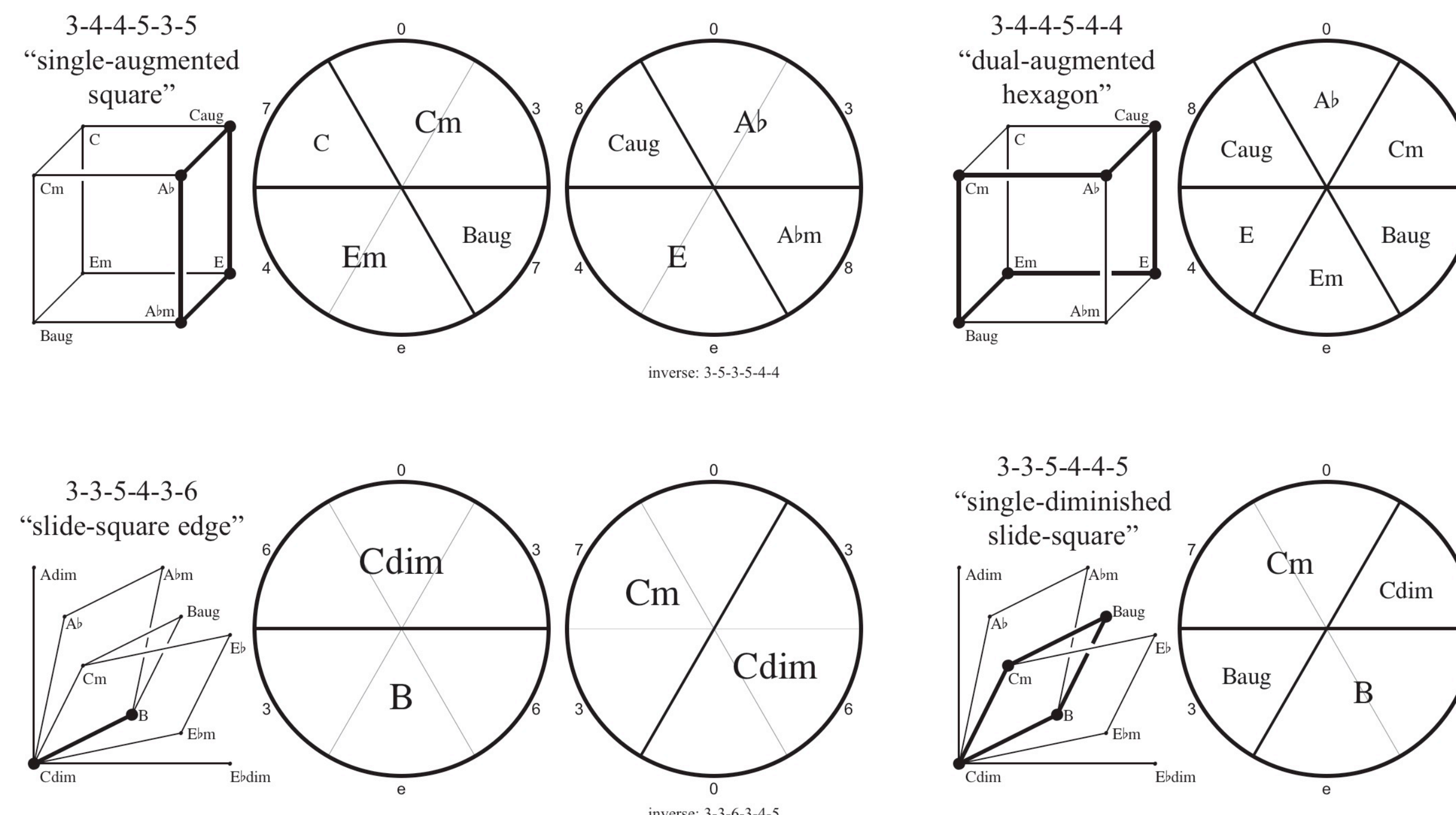
- wedges may contain diminished triads
- opposite voices may differ by any number of semitones

New voice-leading relations are added onto the hexatonic cube and depicted separately in a model that I call the "billfold."



Permutations of the hexagonal room

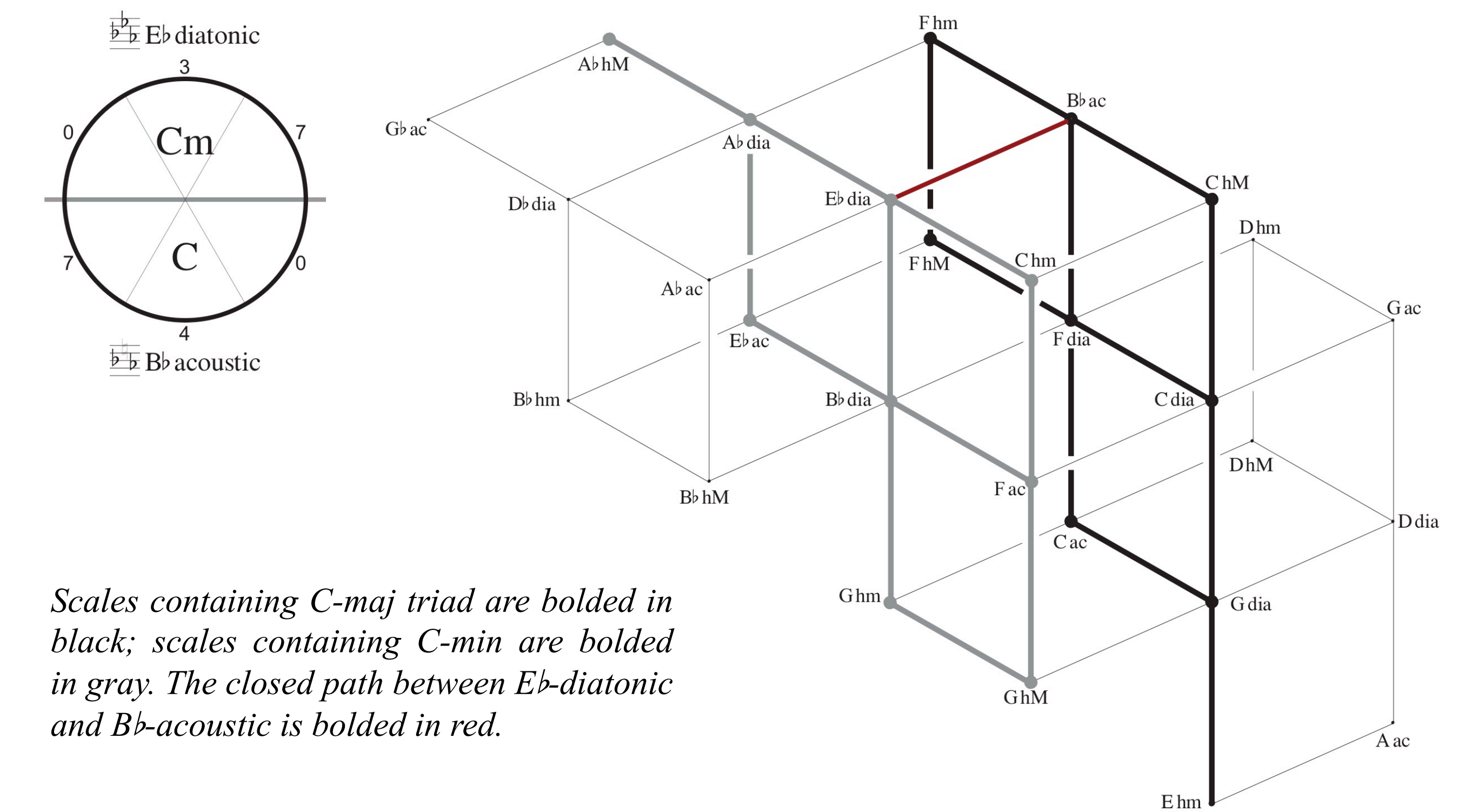
The given properties of the hexagonal room allow for eighteen possible permutations, all of them isomorphic to a closed loop within the hexatonic cube or the billfold.



Four examples of such permutations. (See handout for all eighteen.)

Permissible scales from scale networks

A single voice may belong to multiple chords that do not share a common scale. In such cases, its melodic range must be restricted to those notes shared in common between the scales designated for each chord. These scales, whether diatonic, acoustic, or harmonic major or minor, can be notated as key signatures. Interestingly, every possible arrangement of such key signatures along the periphery of the hexagonal room is isomorphic to a closed loop within Dmitri Tymoczko's seven-note Pressing scale lattice.



Scales containing C-maj triad are bolded in black; scales containing C-min are bolded in gray. The closed path between Eb-diatonic and B-acoustic is bolded in red.

Further areas for exploration and research

The interdisciplinary nature of this manner of composition leaves it open-ended in numerous directions. Some possibilities for further exploration include:

- Incorporation of dominant and half-diminished sevenths (Forte 4-27), Mystic chords (Forte 6-34), and other set classes that represent equal divisions of the octave offset by one semitone.
- Greater sophistication of the user interface, including auditory cues to simulate physical movement, as well as wireless tracking to allow for actual movement within a physical space.

Select bibliography

Cohn, Richard. "Maximally Smooth Cycles, Hexatonic Systems, and the Analysis of Late-Romantic Triadic Progressions." *Music Analysis* 15, no. 1 (March 1996): 9-40.

_____. "Weitzmann's Regions, My Cycles, and Douthett's Dancing Cubes." *Music Theory Spectrum* 22, no. 1 (Spring 2000): 89-103.

Douthett, Jack, and Peter Steinbach. "Parsimonious Graphs: A Study in Parsimony, Contextual Transformations, and Modes of Limited Transposition." *Journal of Music Theory* 42, no. 2 (Autumn 1998): 241-263.

Tymoczko, Dmitri. "Scale Networks and Debussy." *Journal of Music Theory* 48, no. 2 (Fall 2004): 219-294.

_____. "Scale Theory, Serial Theory, and Voice Leading." *Music Analysis* 27, no. 1 (2008): 1-49.

_____. "Voice Leadings as Generalized Key Signatures." *Music Theory Online* 11, no. 4 (October 2005): 1-44.