

Lecture Notes on Pitch-Class Set Theory

Topic 2: Trichords

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General Overview

For several reasons, the trichords will serve as a foundation for hearing and understanding set classes:

there are only twelve of them;

they are relatively easy to learn to hear;

one way to think about larger sets is in terms of the trichords they contain.

We will sort the trichords into three families. This approach, and much of the content that follows, derives from Michael Friedmann's very helpful book *Ear Training for Twentieth-Century Music*.

Family 1 contains the five trichords that have at least one i.c. 1 between two of its pitch classes; family 1 trichords all have the form 01X. Family 2 contains the trichords that have no i.c. 1's, but that have at least one i.c. 2; they all take the form 02Y. Family 3 contains the least compact trichords, those that contain neither an i.c. 1 nor an i.c. 2.

Family 1

To visualize the family 1 trichords, let the i.c. 1 be between C and C#, and let the third pitch class rotate around the circle. D gives us 012, Eb 013, E 014, F 015, and F# 016. These are all of the family 1 trichords; if the third pitch class rotates further, so that our set is {C C# G}, then the largest space is no longer between C and the third pitch class. Instead it is between C# and G, and our set class is 016. As the third pitch class continues to rotate through the circle, we go back down through the family 1 trichords.

Each of the family 1 trichords will be given a nickname, and for each we will give the interval vector and describe its most salient features.

012 “cluster” <2 1 0 0 0 0>

012 is a crunchy dissonance, a cluster of half steps. All of its intervals are dissonant: two i.c. 1’s and an i.c. 2.

013 “octatonic” <1 1 1 0 0 0>

The 013 is the trichord that generates the octatonic collection; like 012 it has both an i.c. 1 and an i.c. 2, but it also has a less-dissonant i.c. 3.

014 “blues” <1 0 1 1 0 0>

If we represent 014 with the pitches C, Eb, and E, we can think of it as a root of a triad (an incomplete one) and two qualities of third, like the triads used in the blues. If your ear is well attuned to the octatonic scale, note that 014 also saturates the octatonic collection – for every 013 in the octatonic collection there is also an 014. The distinct characteristic of the 014 is the dissonance of the i.c. 1 combined with the two different imperfect consonances, i.c. 3 and i.c.4.

015 “i.c. 5, no i.c. 6” <1 0 0 1 1 0>

The salient feature of 015 is the i.c. 5; no other family 1 trichord so far has contained a perfect consonance.

Have you noticed the pattern in the interval vector? Going back to visualizing the set classes as C and C# plus a rotating third pitch class, the i.c. 1 between C and C# is fixed because those pitch classes stay the same. The other two intervals involve the rotating pitch class, and because those intervals are with C and C#, which are next to each other, one of those intervals is always bigger by one than the other. So the interval vector always has an i.c. 1, with a pair of adjacent i.c.’s that gradually move to the right across the interval vector. This means that as we ascend through the family 1 trichords, we always lose the smaller of the adjacent i.c.’s and pick up a new i.c. that’s one larger than the one that used to be the largest.

016 “i.c. 6” <1 0 0 0 1 1>

The 016 is distinguished by its distinctive tritone (i.c. 6), which none of the other family 1 trichords has. Like the 015, the 016 has an i.c. 5, so if you hear an i.c. 5, listen for the distinctive i.c. 6 to distinguish 016 from 015.

Family 2

To visualize the family 2 trichords, let the i.c. 2 be between C and D, and let the third pitch class again rotate around the circle. We don't start with Eb – that would be an 013. Instead we start with E, which gives us an 024. F creates 025, F# 026, and G 027. Again, going past G# “flips” the largest open space to between D and G#, so that the set class name is 026, and continuing to rotate through the circle sends us back down through the family 2 trichords.

Again each of the family 2 trichords will be given a nickname, and for each we will give the interval vector and describe its most salient features. Because the family 2 trichords are most relevantly sorted by whether or not they contain any i.c. 5's, we will take them out of order.

024 “whole tone” <0 2 0 1 0 0>

024 sounds like a whole-tone cluster, with two i.c. 2's and an i.c. 4. The only other family 2 trichord that is a subset of a whole-tone scale is 026, which has a distinctive tritone.

026 “Mm/half-dim” <0 1 0 1 0 1>

As just stated, the 026 is also a subset of the whole-tone scale, and its distinctive interval is the tritone; it is the only family 2 trichord that has an i.c. 6. Depending on which inversion is used, it either sounds like some inversion of a major-minor seventh chord (e.g. {C D F#}, with D as the root) or else some inversion of a half-diminished seventh chord (e.g. {C E F#}, with F# as the root).

025 “mm” <0 1 1 0 1 0>

The 025, like the remaining family 2 trichord, the 027, has an i.c. 5; the salient perfect consonance makes these clearly not whole-tone sonorities. Unlike 027, 025 also has an i.c. 3; depending on the inversion, it either sounds like a minor-minor seventh chord (e.g. {C D F}, with D as the root) or like an ambiguous seventh chord with no third (e.g. {C Eb F}, with F as the root).

027 “suspension” <0 1 0 0 2 0>

The 027 is distinctive because of its two i.c. 5's; its various voicings sound like a triad with a suspended third (e.g. {C4 F4 G4}, {C4 D4 G4}, or {C4 F4 Bb4}).

Family 3

The three trichords of family 3 are all familiar from tonal music; they are the diminished triad (036), the major or minor triad (037), and the augmented triad (048). Since you already know how to hear them, their distinctive features will not be discussed.

036 “diminished” <0 0 2 0 0 1>

037 “major/minor” <0 0 1 1 1 0>

Recall from the notes on set classes that major and minor triads are members of the same set class, 037.

048 “augmented” <0 0 0 3 0 0>