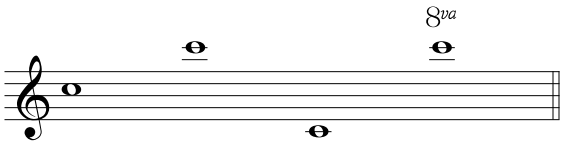
Introduction to Pitch Class Set Analysis

Pitch Class - A pitch without regard to its octave position. There are twelve total pitch classes.

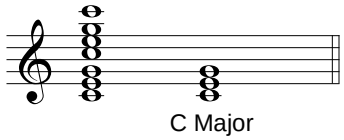
There is only one pitch class (C) represented here.



Pitch Class Set - A group of pitch classes. Usually it isa motive that occurs melodically, harmonically, or both. **Cardinal number** refers to the number of elements in a set. A cardinal three set has three members.

Octave Equivalence - In tonal music, if two notes an octave apart are presented we attribute them to the same tonal significance. When we hear a chord with widely spaced notes we recognize it as an expanded form of a closed position chord.

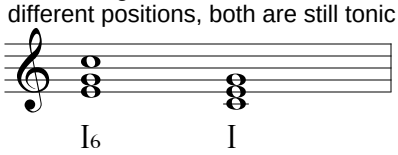
Removal of redundant pitch classes.



C Major

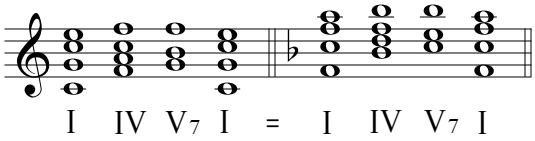
Inversional Equivalence - When a chord changes its position (inversion) we recognize it as being the same chord.

Even though these two chords are in different positions, both are still tonic functions.

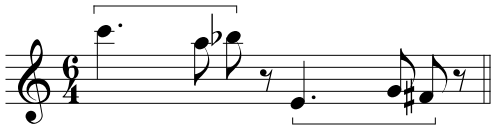


Transpositional Equivalence - In tonal music, when a pattern of notes transposes to another pitch level its identity is retained.

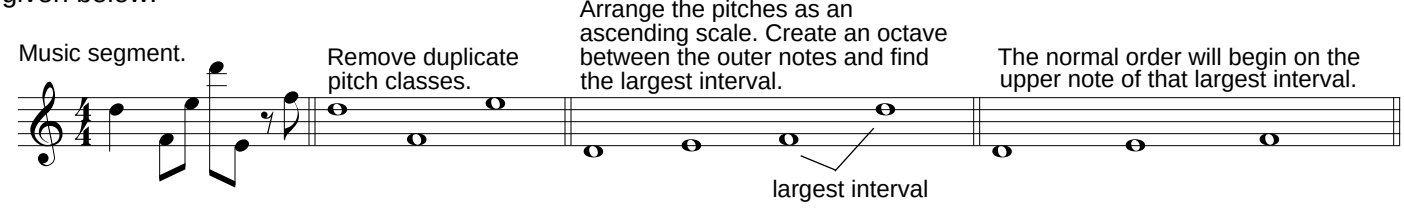
Though the keys are different, one hears the chord functions as being equivalent.



Segmentation - The procedure for determining which musical units of a composition are to be regarded as analytical objects. Consider all musical parameters (register, duration, timbre, etc.) in determining segments. Segments are usually identified as contiguous elements but may be non-contiguous as well. The consistency of a musical surface composed of small groups of pitch-classes is regarded by Forte as a foundation for making statements about large-scale structure. In the following example, register, rhythm, and pitch content all play a role in determining the two segments.

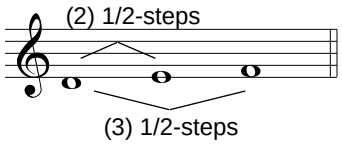


Normal Order - A pitch class set reduced to its basic form. That is, all duplicate pitch classes have been removed and the smallest interval possible has been formed between the outer two notes. One way to do this is given below:



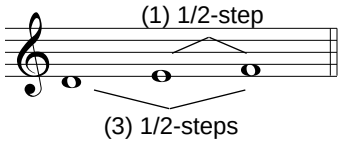
If there exists two instances of the largest interval, both must be checked.

Assign numbers to each note of the normal order. These numbers represent the distance in half-steps above the lowest note in the set.



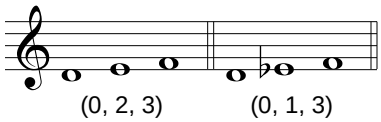
The set = (0, 2, 3)

Inversion - A set and its inversion are considered to be different representatives of the same set type. In other words, a set and its inversion are considered equivalent. The normal order as well as the inversion of the normal order must be checked to determine the best (or better) normal order. To find the inversion of a set, simply count the half-steps from the top note to each lower note.



The inversion of the set = (0, 1, 3)

For the sake of comparison, the set's inversion may be renotated. Remember that the original pitches of the set are not important in performing this analytical method. It is the most intervallically compressed form of the set that we are after.



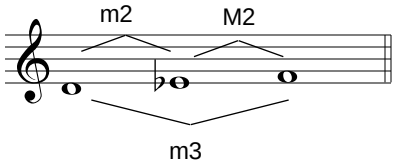
Best Normal Order (BNO) - The generic representation of all the possible transpositions and inversions of a set. The set in its absolutely most intervallically compressed form. To find the BNO one must check a set's normal order (prime) against its inversion. The most compressed form (prime or inversion) is the BNO. In the above example, the (0, 1, 3) form is the most compressed because the interval between the first and second notes is smaller than the interval between the first and second notes of the (0, 2, 3) set. The D, Eb, F set is the BNO.

Prime Form - A set is reduced to its prime form to allow comparison with other sets. If sets were compared in their original form, comparison would be problematic at best. This is the set's BNO represented by numbers. These numbers represent the distance in half-steps above the lowest note in the BNO. In the above example, (0, 1, 3) is the prime form.

Interval Class (ic) - An interval expressed in its smallest form. Compound intervals are reduced down to within an octave. The inversion of intervals are considered equivalent. A M9th (M2) and a m7 are therefore considered equal. There are six interval classes:

1	2	3	4	5	6
m2/M7	M2/m7	m3/M6	M3/m6	P4/P5	TT

Interval Vector - The interval vector essentializes the character of the set. It is the overall interval class content of a set. Sets may be outwardly different but have identical interval vectors (such as 5-Z12 and 5-Z36). This is called a **Z-relation**. In atonal music, when one of a pair of Z-related sets is present the other in the pair is often used in the same composition. To determine the interval vector for a set compare each set member intervallically as in the example below. The interval vector is written enclosed in brackets.



Perform an inventory of the number of instances of each interval class found in the set and fill in each column of the interval vector. The interval vector for the above set would therefore be [1,1,1,0,0,0].