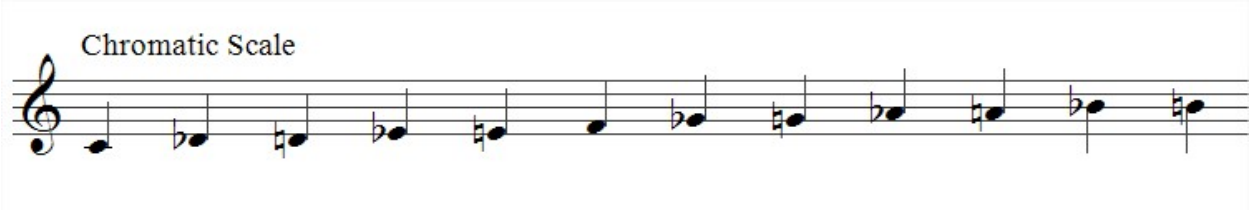
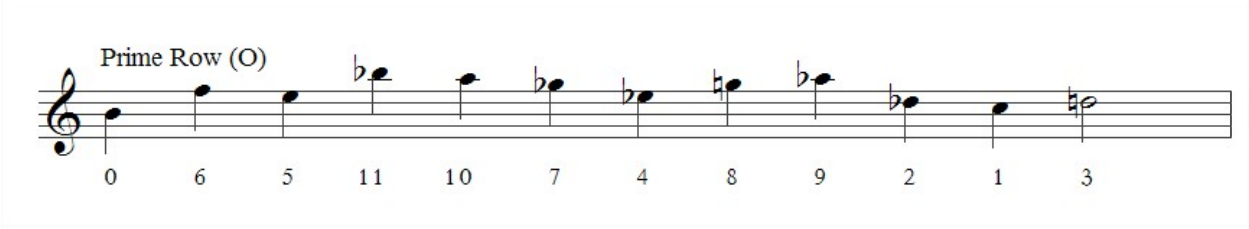
Serial for Breakfast – The Series

In all western music, tonal and atonal, the basic set of notes is the *Chromatic Scale*. Ever since the well tempered scale was created way back when, these have been the notes to work with. It starts with *C* and goes up to *B* in semi or half tones.

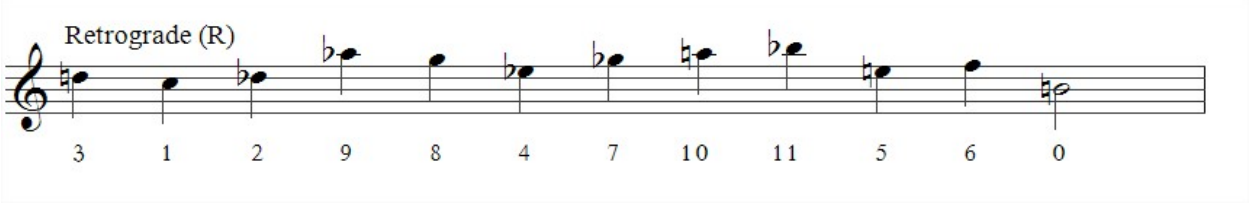


Twelve tone or *serial* music (which we'll call it from now on) is based on this chromatic scale as well. However, in an effort to distinguish it from tonal music, Schoenberg developed the row or series. It used all the notes in the chromatic scale but ordered them so none were repeated until all twelve had been stated. Here is an example.

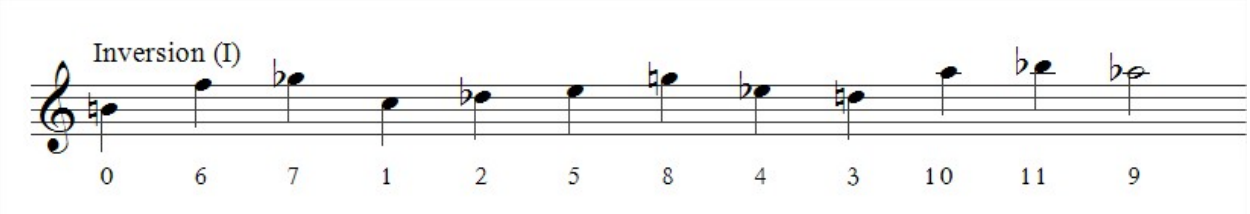


As you can see, all twelve are there but no tone is repeated. What you really have, besides the individual notes, is also a set of intervals. You can start a row on any note you want. As you can see, there are numbers or integers associated with each note. The first note of the row, or reference pitch, is always *0*. Each number after that represents the number of semitones from the previous number. The first note in the row above is *B* and assigned the integer *0*. The next note is *F* which is six semitones up from *B* and, therefore, assigned the integer *6*, and so on.

There are four basic variations of the row. The first, shown above, is the Prime or Original row. The second variation is the *Retrograde* and is the original row in reverse. The numbers always remain related to the reference pitch, which for this row is *B*.

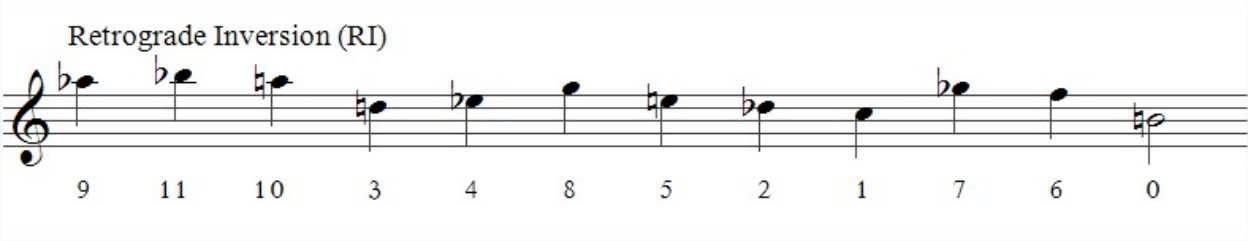


The third variation is the *Inversion* which essentially inverts the primary row so that all interval directions change.



As you can see, the original interval of *F* to *E* (or 5 to 6) is inverted or turned upside down to *F* to *Gb* (or 6 to 7). This pattern of inverting continues for the rest of the row.

The fourth and last variation is the *Retrograde Inversion* and is the *Inversion* row in reverse, as we did earlier with the *Retrograde*.



The reason Schoenberg did this was to ensure a tone wouldn't be repeated so that it wouldn't suggest, in the listeners mind, a tendency to have some sort of center or home base, as is the case in tonal music. Tonal music is based on the harmonic practice of a key signature and related chords that always have a tendency to return to the root, or a home base.

He went so far as to say a composition should be based on one row and its four variations only to avoid this tendency. In reality, this proved to be much less of a concern than Schoenberg expressed and, in fact, composers have used many rows and their variations in a single composition without creating this tendency. We'll look at other variations of the row next time.

In *My Writings* page, I have list of books that present *Serial* music more in-depth, if you're interested. If you have any questions or need some help better understanding this, email me at *composerprov@musicbyprov.com* and I'll be happy to help.

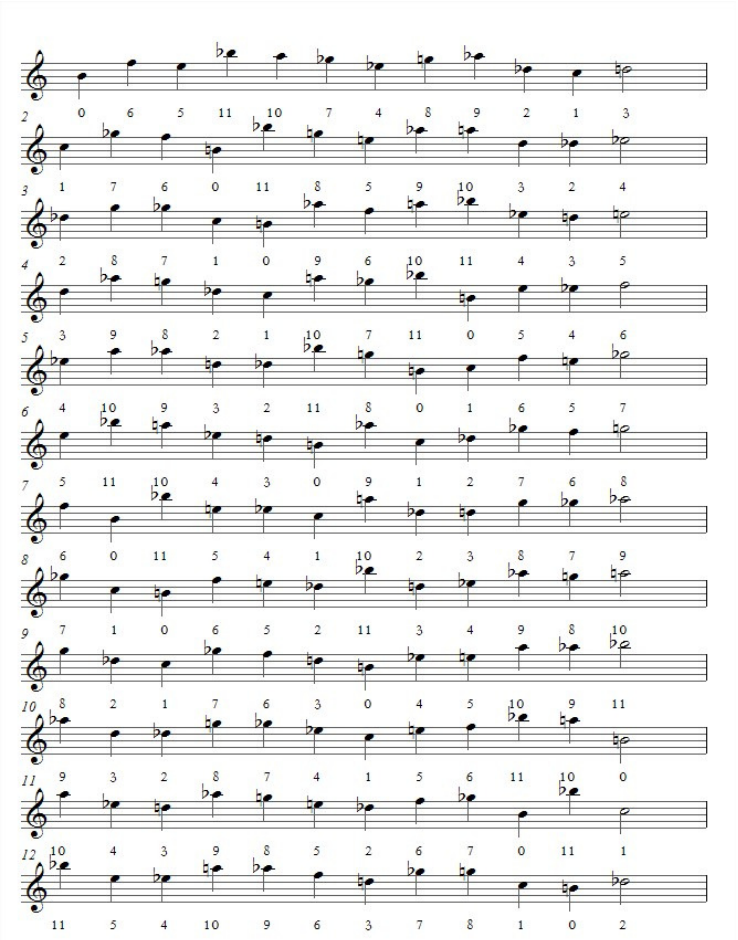
Thanks.

Serial for Breakfast – "What is the Matrix"

In the last presentation, we established the row or series and the four basic variations of the series. These are:

- Prime *(the original series)*
- Retrograde *(the Prime in reverse)*
- Inversion *(the Prime upside down)*
- Retrograde Inversion *(the Inversion in reverse)*

There are twelve possible transpositions of each of these four row variations. The original and eleven more in semitone increments. After the first row, transposing the subsequent row by a semitone and repeating that for remaining the rows, will establish a 12 X 12 grid or *Matrix.* By repeating this transposition for each of the four variations, you end up with four sets of matrices. These four matrices with a total of 48 series are used for both vertical (harmonic) and horizontal (melodic) sound sources.
Here is the 12 X 12 *Matrix* for the Prime row.



To review what I wrote in an earlier blog entry, there is a difference between ***Pitch*** and ***Pitch Class***.

A ***Pitch*** is unique unto itself. It has its own frequency (cycles per second) and function in a tonal environment. In that context, a **C#** is different than a **Db**. They have slightly different frequencies and belong to different key signatures. Also middle **C** (or referred to as C_4) is different than the **C** an octave above that (referred to as C_5). In fact the same note (in this example **C**, although it could be any note) is always a different *Pitch* when it is in a different octave or register.

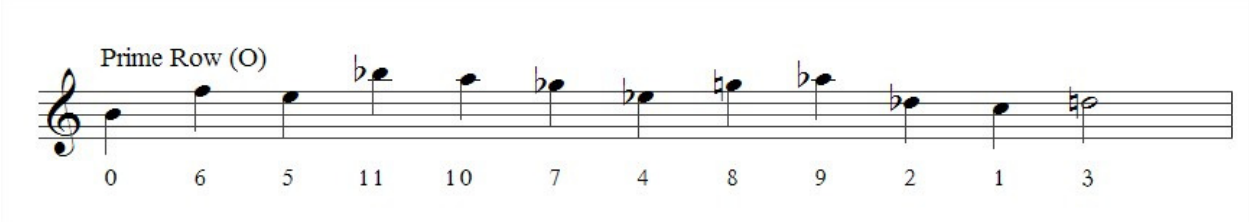
A ***Pitch Class*** is all the pitches with the same name. They are, what is referred to as *Octave Equivalent* and *Enharmonic Equivalent*. Now before you start accusing me of throwing around big words, let me explain this in simpler terms. *Octave Equivalence* means that regardless of what octave the pitch is located at on the staff, it's the same pitch class. It is regarded as equal. An *Enharmonic* is the accidental that is applied to a note, which is either a flat (b) or sharp (#). In *Pitch Classes* a C# and a Db are the same. There is no differentiation because they're not part of a tonal function (i.e., key signature).

Without the functionality of a key signature, the use of accidentals seems to be one of personal preference. Some composers use sharps for ascending notes and flats for descending notes. Personally, I use only flats because I believe it to be less confusing when you read my scores. Whatever your preference, there is no hard and fast rule for using accidentals.

In most cases, complex accidentals like double sharps or double flats are avoided, mostly because they're more difficult to read. Personally, I never use an **Fb** or **D##** because reading it as **E** makes more sense. Likewise, I never use **A##** or **Cb** because reading it as **B** seems more natural to me. I think the use of accidentals should facilitate the reading of the score and any of its parts. The K.I.S.S. rule applies here, in my opinion.

In serial music, we use pitch classes because we don't care about what octave they're at or what accidental they use. A **C** is a **C** is a **C**. That's it! Next time, we'll talk a little about orderings. I'll warn you now, it can get a little complicated but we'll cut through the fertilizer and cut to the chase.

Oh by the way. It occurred to me, thanks to some valuable feedback from my friend Byron, that maybe I should explain the term *Interval*. An interval is the distance between two notes. It has direction, either up or down. Let's look at the prime row we used in our last discussion.



The interval between the first and second notes of the row is the distance between **B** and **F**, which is six semitones. In the tonal world, this would be regarded as a flatted or diminished fifth, because in the key of **B**, an **F#** would be the *perfect fifth* and, moved down a semitone (to **F**) would make it a *flatted* or *diminished fifth*. Actually, to be consistent with the key signature, the **F** would written as an **E#**. Are you confused yet? Well, such are some of the rules that govern tonal music where key signatures and their related scales are involved. These rules are actually more rigid and restrictive than the rules that apply to serial music.

As may becoming apparent, for those schooled in tonal methods (as most of us have been), it takes some re-learning to adapt to the twelve tone system. It's requires a different mindset; a different way of thinking. The most difficult challenge for an experienced tonal composer is to forget what he or she has learned, at least from a technique standpoint. Certainly some of the aesthetic aspects of music are universal and not dependent on any system or method. A composer must still bring that to his or her work. But the two systems are like two different languages, with only a few things in common (like the chromatic scale).

Besides presenting some of the basics of the twelve tone or serial method, I think it's important to understand some of the challenges it presents to both the composer and the listener. I will discuss some of these as we continue.

Thanks, Prov

Serial for Breakfast – Orderings

A discussion about the ordering of pitches, pitch classes, intervals and interval classes will bend your brain and probably cause a disturbance in the force, which will piss Yoda off. I'm not going to do that. Instead, I'm going to share a few definitions with you that, hopefully, explain about *orderings*.

I will recommend a book for further study, which is my source for many of these definitions. As I mentioned in the previous presentation, much of what I will present to you does more to explain twelve tone systems then govern its use in actually composing. The only rule that applies in composing is that there are no rules. This is the book I'd recommend.

Introduction to Post-Tonal Theory (3rd Edition) by Joseph N. Straus
From Pearson/Prentice Hall © 2005, 2000, 1990

This is a comprehensive book that thoroughly covers the subject in great detail. It is aimed at the serious student. Straus works at the Graduate Center of the City University of New York. I found the book at Amazon, like I've found the majority of the books I've obtained on the subject.

Ordering simply means the order in which each element of a group is presented. You probably already knew that but I wanted to make sure we were in synch. Here are some definitions as presented by Straus in his book.

- **Intervals**: Intervals are identified by the number of semitones they contain.

- **Ordered Pitch Intervals**: A pitch interval is the interval between two pitches, counted in semitones. + (plus) means an ascending interval, - (minus) means a descending interval.

- **Unordered Pitch Intervals**: An unordered pitch interval is simply the space between two pitches, without regard to the order (ascending or descending) of the pitches.

- **Ordered Pitch Class Intervals**: A pitch class interval is the interval between two pitch classes. On the pitch class clockface, always count clockwise from the first pitch to the second.

- **Unordered Pitch Class Intervals**: An unordered pitch class interval is the shortest distance between two pitch classes, regardless of the order in which they occur. To calculate an unordered pitch class interval, take the shortest route from the first pitch class to the second, going either clockwise or counter-clockwise.

- **Normal Form**: The normal form of a pitch class set is its most compact representation.

- **Prime Form**: The prime form is the way of writing a set that is most compact and most packed to the left, and begins with 0.

As I said, these are not considerations in composing. They are simply explanations of what the different type of orderings are all about. They are useful in understanding the twelve-tone system but not essential in using it to compose or even to listening to twelve-tone music.

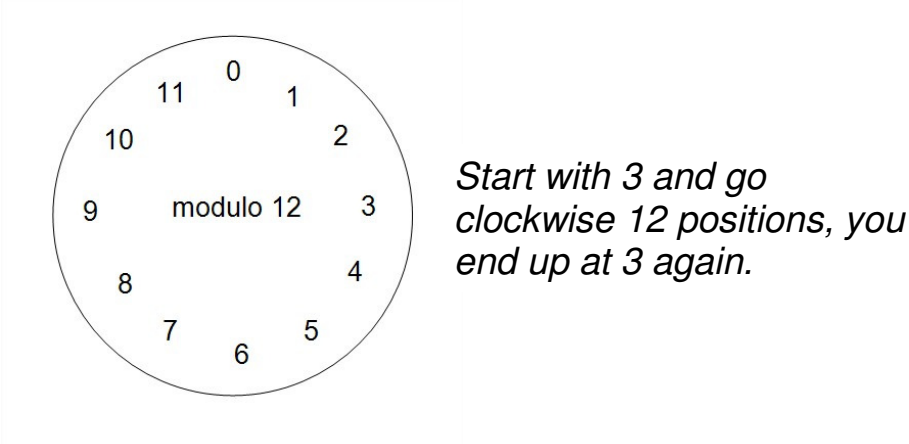
I'm presenting it here to try and be comprehensive, while not being too elaborate. I wanted you to know what *orderings* were all about, but wasn't going to go into a detailed explanation. If you want that, I urge you to buy the book I mentioned. But I feel this is enough to make you aware, but not so much that you'll fry brain cells. There are other, more fun things that'll do that, and you should save your brain cells for those experiences. Serial music is, ultimately, music you should listen to, not agonize over.

Thanks!

Serial for Breakfast – Mod 12

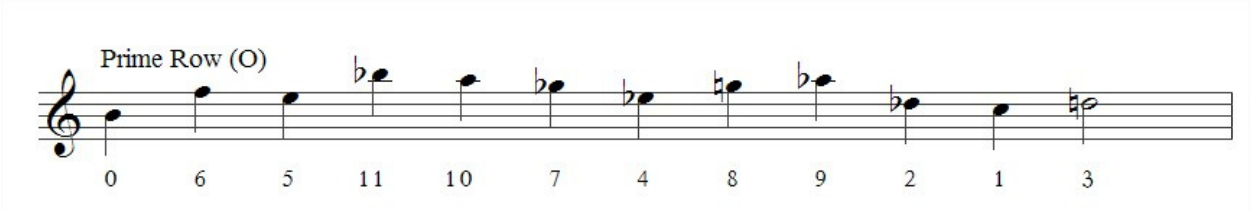
Each pitch belongs to one of the twelve pitch class sets. You add 12 semitones to go up an octave, and you subtract 12 semitones to go down an octave. This simply creates another member of the same pitch class. Remember a *pitch class* is all the pitches of the same name.

Here's an example. If we start on ***F*** above middle ***C*** and, for example, that's pitch class 3 in our row or set, then go up twelve semitones, you wind up back on pitch class 3. In other words 3 + 12 = 15 but because of modulo 12 arithmetic, it's actually pitch class 3 not 15 (3 + 12 = 15 = 3). The best way to illustrate this is with a clockface.



Start with 3 and go clockwise 12 positions, you end up at 3 again.

The reason we do this is to keep the integers between ***0*** and ***11*** regardless of what octave the pitch may be at. This way we put all the occurrences of a pitch, in any octave, in the same pitch class. Let's look at our prime series again. So you know, the collection of 12 tones we're looking at is known by several names including *"row"*, *"series"*, and *"set"*. These terms are used interchangeably.



Let's take pitch class 5 (which is an ***E***). Go up an octave *(adding 12 semitones)* which is *5 + 12 =* ***17***. But, using our Mod 12 clock, it is actually ***5*** *(5 + 12 = 17 – 12 = 5).* Pitch class 5 is pitch class 5. The purpose, as I said, is to limit the integers to ***0*** thru ***11***. This compensates for the *Octave*

Equivalence we talked about before. An ***E*** is an ***E*** is an ***E***, irrespective of what octave it's positioned on the grand staff.

This is not something that's consciously used when composing. The composer will place the pitch class wherever he or she feels it should go, usually within the range of the instrument playing it. We don't use the mod 12 arithmetic as a composing tool. It's used to explain how a pitch class is the same, regardless of octave. We assume that and put the pitch in whatever octave makes sense, or suits our aesthetic.

You will find that most of the things we'll be talking about explains things rather than governs their actual usage in the music. It's important to understand all the aspects of serial music if you intend to be a serial composer. This is why I've devoted so much time and effort to my studies. But for you, the listener, knowing these things will, hopefully, give some insight into what you're hearing. If it enhances your listening experience, then I'm glad my humble presentations helped.

Next time, we'll talk about *Orderings*, what they mean and how they relate to the music.

Thanks, Prov

Serial for Breakfast – Melody and Harmony

Two of the most fundamental elements of music are melody and harmony. They are the most recognizable parts of the music we hear every day and the most basic constituents of tonal music. Within that context, melody and harmony closely follow the various scales, their associated chords and all the rules that govern them. This is true of just about all genres, from classical to pop. They have been part of tonal music since its beginning.

In twelve-tone music, these elements are still important. But because of the nature of twelve tone music, melody and harmony are dramatically different. In the earliest days of atonality, the works of Schoenberg, Berg and Webern began to redefine melody and harmony. At first it was in free form. Then after Schoenberg developed the twelve tone system, it began to use the series or row as its foundation.

In the post-war years, serial composers wanted to differentiate their music from what had come before and, therefore, there was little to no suggestion of melodic or harmonic elements, at least in the way we'd come to recognize them. Works like Boulez's *Le Marteau Sans Maitre* and Stockhausen's *Zeitmasse No. 5* redefined how serial music would sound.

Of the three composers that formed the second Viennese school, Webern was the biggest influence on this post-war generation of composers. They felt that Schoenberg and Berg were more influenced by the romantic music of Mahler, Strauss and Wagner, while Webern seemed to detach himself from that influence. His music became a strong influence on these new composers. So there was this period of deliberate separation from the influences of the past which brought about music with virtually no suggestion of melody or harmony.

Serial music composed since that time has become more melodic and harmonic, but in different ways. Melody and harmony are no longer the bad guys to avoid. They can be compelling elements of twelve tone music alongside the elements akin to those used by the post-war composers. This mix of sonorities, along with the rhythmic elements that evolved since the beginnings of serialism, give the music a fresh new sound.

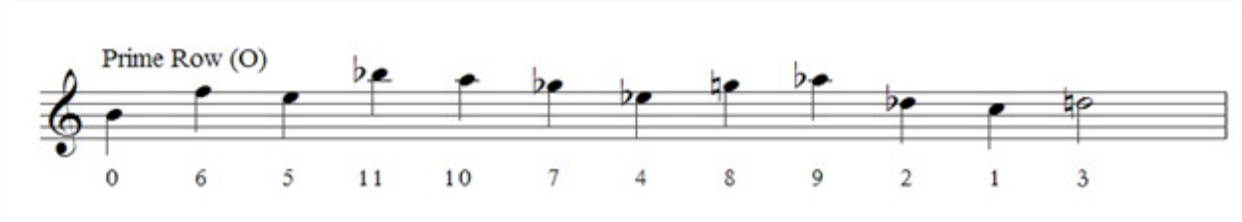
But it's not my intent to give you a detailed history of the evolution of twelve tone music. I want to explain how melody and harmony is developed using the twelve tone system.

When choosing the ordering of the twelve tones in a series, besides ensuring you don't repeat a tone until all are stated, it's common to arrange the tones to suggest a motif or melody, and that includes what register to place them in. It should be stated here that this is not a rule of twelve tone music. The ordering can be based on many different things such as a particular grouping of intervals or even a mathematical scheme using the integers. I tend to use all of these in creating a series.

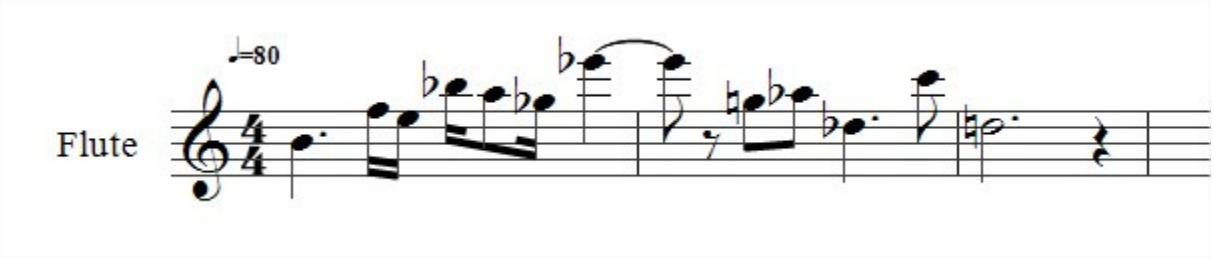
But I have to be honest, I choose the ordering of my rows more often than not based on the melody, motif, theme (whichever you choose to describe it) that it suggests to me. I use this to intentionally establish a melodic element in my music. I may mix it with other more jagged, angular passages, but I return to its melodic tendencies to establish motifs throughout a piece. As I enter each of the basic variations (P, R, I and RI), the motifs change accordingly, establishing the variation on the theme.

This is not how it's always done, but it's what I do. You can listen to examples of serial music from various points in time, from various composers, and hear for yourself how the melodic element manifests itself. I am only sharing with you my own practices, my own way of developing melody. To me, melody is still an important element of music. I use it often in my own music and am not particularly concerned that I do. There are no rules, only choices.

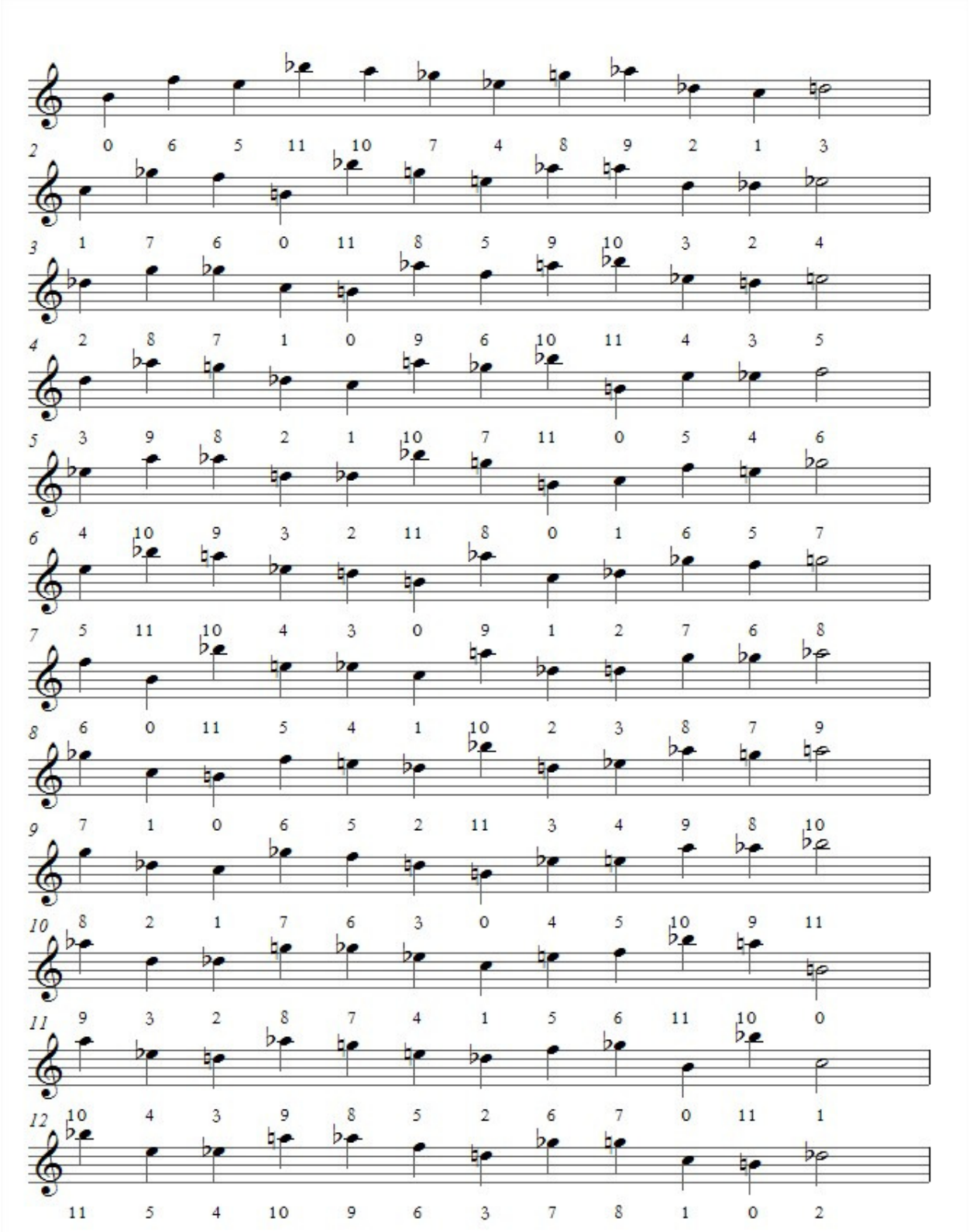
Let's return to the prime row we've been using.



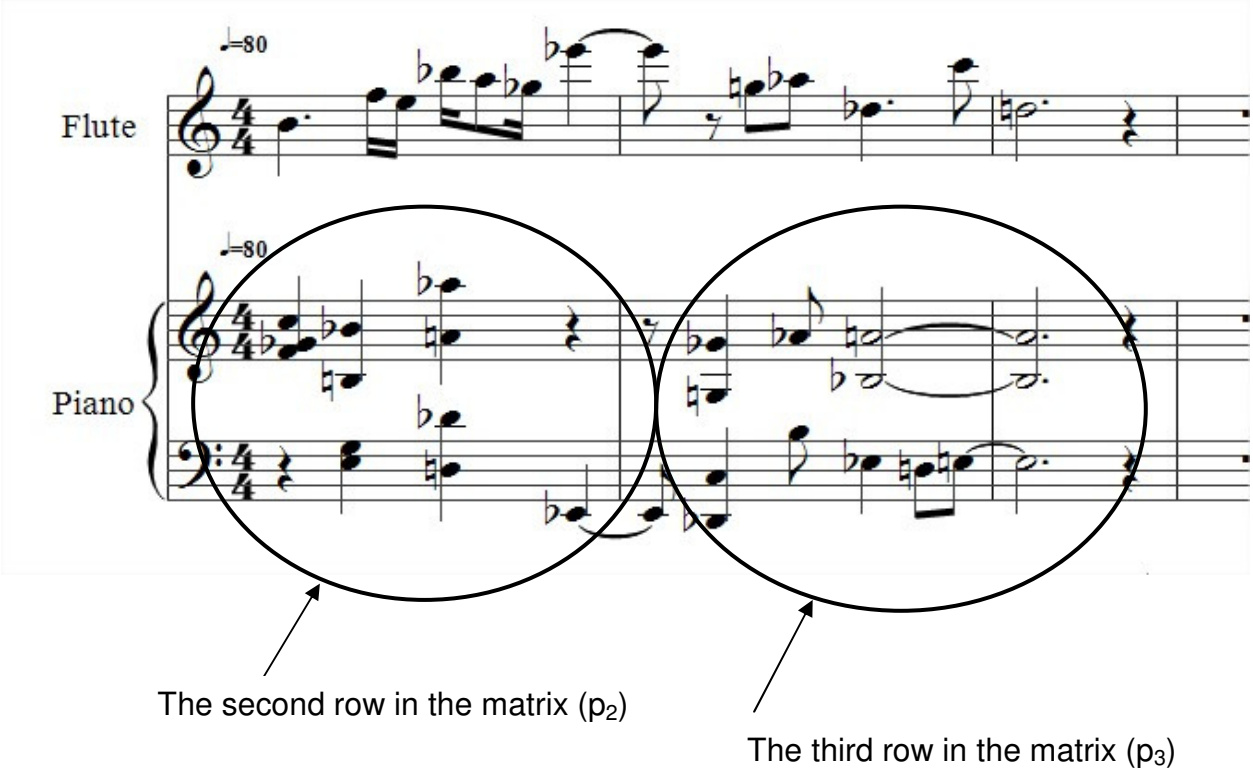
Here's an example of a melody derived from that row.



Let’s again look at the entire 12 X 12 matrix for this row.



Here is that same flute melody but with a piano accompaniment using the p_2 and p_3 rows from the above matrix to establish a harmonic element.



The second row in the matrix (p_2)

The third row in the matrix (p_3)

All that I've done is taken notes from the p_2 and p_3 series, and combined them into *trichords* and *tetrachords* (or 3-note and 4-note chords). Because we're not dealing with tonality and the diatonic scale and its associated chords, we can create whatever chords we want, based on the series and its permutations. The common thread is that they relate to each other and to the prime row we've used, so they are all constituents of that row.

What makes it work, in terms of how it sounds, is dependent on the skill of the composer to create just the right interplay between the melody and its harmony. As I have said many times, the only rule is that there are no rules. The final arbiter is how it sounds. You can create the most clever, inventive scheme for developing melody and harmony, but if it doesn't sound good, it's not worth the effort. Approaches to developing melody and harmony are as varied as the number of composers doing the developing.

Works, like operas or songs, by their nature demand a melodic element, if for no other reason than to give the singer a way to sing the words in a comprehensible fashion. Even Boulez has written some works for voice and ensemble that have very beautiful and compelling melodies; *Le soleil des eaux* is one such piece. But even in instrumental pieces, composers use melodic and harmonic elements to add an additional dimension to the work, to go along with the other sonorities and the rhythmic patterns they use.

Another way of establishing an harmonic element is through counterpoint. When several melodies are sounding simultaneously, as is the case in contrapuntal passages, the juxtapositioning that occurs, even randomly, creates an harmonic element. Unlike a chord (of any size), the multiple streams of melody create a sonority that strongly suggests harmony without deliberately creating it. Sometimes it creates an even richer, more complex harmonic feel than just simple chords alone can do, mostly because it puts the harmonic element in motion.

So, in the final analysis, melody and harmony are alive and well within the confines of the twelve tone system. They are different than their counterparts in tonal music and, certainly, constructed differently. But their function in the music is the same. They satisfy that need to recognize a theme that helps identify the work. It's clearly not the only identifying factor, but it allows listeners to apply that particular pattern recognition phenomena to serial music. Once they become accustomed to how melody and harmony are used in twelve tone music, they'll be better prepared to recognize the other elements that differentiate this music from all others.

Our role as composers must expand to include educating our listeners; helping them to recognize patterns and elements that they're unaccustomed to hearing. This will help them to expand their own horizons and what music is in their minds. That's a very worthwhile effort and one that will help create a new group of listeners to our music.

Thanks.

Serial for Breakfast – Rhythm

Rhythm is not a separate thing. A series of pulses doesn't mean much by itself, other than remind you of that story by Edgar Allen Poe. But when these rhythmic values are linked to other sounds, it's a different story. When they're associated with a series of pitches, it takes on a different meaning. They interact with each other.

Rhythm, however, is generally different in tonal music then it is in serial music. Serial music is characterized by the presence of all twelve elements of the total pitch class vocabulary nearly all the time. This is why it is based on pitch *ordering*, not *content*. Unlike tonal music, where rhythm is characterized by periodicity *(occurrences at regular intervals)*, in serial music it, is characterized by irregularity *(no, not that kind of irregularity)*. The tendency among composers since Wagner has been to complement the homogeneity within the pitch class hierarchy with rhythmic irregularity *(yes, that kind of irregularity)*. In highly chromatic music, the relationship between pitch and rhythm seems to be the reverse of what it is in tonal, diatonic music.

When we talk about rhythm, we're really speaking about *temporal interval*, the temporal *(relating to measured time)* distance between an initiation of a musical event *(i.e., attack)* that we perceive as pulse. The actual duration of the events whose initiations set the pulse is less significant. We clearly don't want to prescribe every detail of rhythmic behavior, but there are some suggestions for making rhythmic surfaces in serial music. It's generally advised to use a lot of rhythmic aperiodicity *(occurrences at irregular intervals)*, whether it's meter, beat division, foreground rhythm or all or a combination of these.

This doesn't mean that regular pulsation should be avoided, but regularity is more the exception in serial music. Anything exceptional usually calls attention to itself, so any rhythmic regularity you use in serial music is best at significant moments, not casually tossed in wherever or whenever. It's like..it's OK to wear orange clown feet, but you really shouldn't wear them to dinner at your mother-in-law's, unless that's your thing.

Typically, sequential rhythmic repetition should be avoided, and certainly one such gesture shouldn't follow another identical (or almost identical) one. Usually, a typical question and answer phrase division, inherited from

the diatonic music of the past, is viewed somewhat metaphorically. You shouldn't go beyond roughly balancing phrase halves, and avoid literal repetition. There is a distinction between irregularity of meter and irregularity of metric subdivision, or the succession of beats and the way they're subdivided. Both are useful in making and ornamenting the *surface* of a composition.

When we talk about the *surface* of a composition, what we mean is this: We not only identify the succession and combination of sounds in the *foreground*, but we also sense a more deeply buried *background*, which is a more general and abstract network of relationships. Actually, we're aware of a multiplicity of layers, not just these two. In a good piece, these are in lively communication with each other. This *foreground* is what is refer to as the compositional *surface.*

Something else to consider; the effect of tempo on the kinds of rhythmic unfolding we've been talking about is very marked. In most cases, we've assumed a moderate-to-fast rate because it's at these speeds the perception of larger units of temporal succession are most easily recognized. At slower tempos, regularity is much less obtrusive unless it's really emphasized like using bass drum thumps. The periodic/aperiodic continuum can provide a composer with a choice as to just where to locate his piece.

So these rhythmic situations generally apply to serial music but are by no means cast in stone. As with all other elements of serial music, there are no hard and fast rules. What we've discussed is extrapolated from the many serial compositions that have been written since the system's beginnings.

The fact that register is not a differentiating factor in stating a pitch class allows us to place a note in any octave. Rhythmic patterns that allow that to happen in a perceptible fashion (i.e., a tempo capable of letting these octave jumps be heard and recognized) becomes a consideration, both from a perception perspective and an execution viewpoint. A player can execute these octave jumps more successfully at a tempo slow enough to allow it. If the tempo is too fast, these executions become more difficult and less likely to be recognized by the listener.

In short, irregular rhythms are more prominent in serial music than regular rhythms. A lot of things need to be considered in choosing any rhythmic patterns in serial music, more because of its nature tending more toward interval ordering than interval content. The best thing for the listener to do to better understand this is to listen to a variety of serial compositions. I'm going to suggest a very short list as a starting point.

- *Movements for Piano and Orchestra (Stravinsky)*
- *Le Marteau sans Maitre (Boulez)*
- *Quartet for the end of time (Messiaen)*
- *In Memoriam Dylan Thomas (Stravinsky)*
- *Density 21.5 (Varese)*
- *Variations, Opus 27 (Webern)*
- *Structures 1A (Boulez)*

I would also highly recommend the following book as an overall text on composing in the twelve tone system, and my source for much of what I presented here.

Simple Composition by *Charles Wuorinen* (Edition Peters CMB 11)

Thanks.