Rolf Wallin:

Crystal Chords

- a search for consonant atonality

In most of the the various musical techniques I have built up during the years, one can find the affinity to simple procedures that yield complex material. And when I say complex, I do not mean the complicated, the cumbersome and the difficult, but rather something that has a manyfaceted quality, a world within the world to explore.

I personally find such a quality in the harmonic structure of the piece, a system I had worked on for some years, but that I felt moved into the centre of my interest as the fractals moved out. The nickname I have given them, Crystal Chords, might have a New Age ring, but it simply refers to their growth in a sort of three dimentional "interval space", forming cubic crystals like those of pyrite or salt.

In short, the system is based on three germ intervals, that are multiplied and stacked on top of eachother. Many multiplications make a "scale", few multiplications give a "chord", which is a subset of the "scale", just as the C major triad is a subset of the C Major scale. One big difference is that the Crystal Chords do not repeat themselves at the octave, but evolve in unpredictable ways through the octaves, yet still having an inherent quality or "flavour" that depends on the quality of the germ intervals. Dissonant germs make dissonant chords, consonant germs make consonant chords. And as the consonance is of a very ambiguous kind, without any clear tonality, I am tempted to use the term "consonant atonality". (If you feel this term as a selfcontradiction, you are a victim of a prejudice originating from the historic fact that atonality was introduced by the Expressionists of the German-Austrian tradition, for whom agony was on the agenda more often than bliss.)

This tendency to expand the traditionally hard-edged modernist harmonic palette and let it also include more warm and bright sonorities, is not at all unique to my music. Listening to compositions made during the last two decades, one finds a strong tendency to seek a kind of harmonic framework without crawling backwards into the mother's womb of History, as neo-romanticists and most minimalists do. This is done in many ways, one of them is the French "Spectral" school, taking the harmonic basis from the analysis of natural and instrumental sounds. You can also find a parallell in today's architecture, looking quite different from the brutalist concrete fortresses of the sixties, but still using the same principles.

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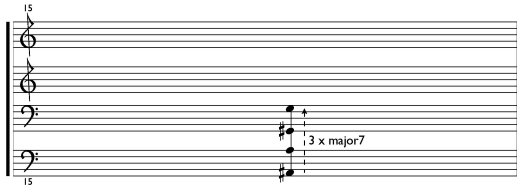
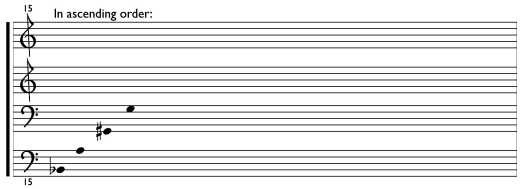
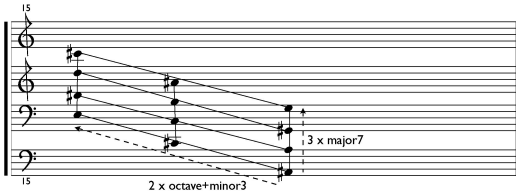
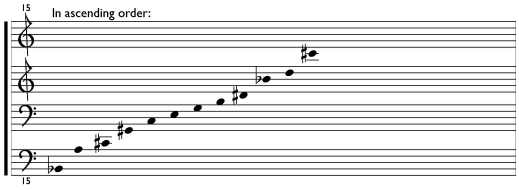
The system is quite simple: on a given root tone, stack a number of Germ Interval 1
(in this example: a major seventh)



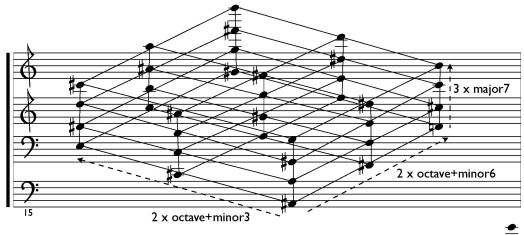


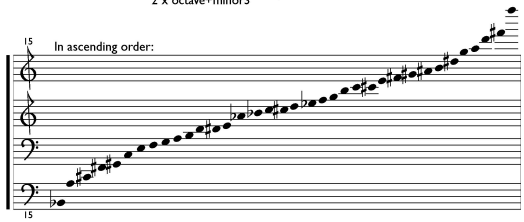
On each of the resulting notes, stack a number of Germ Interval 2
(in this example: an octave + a minor third)





On each of the resulting notes, stack a number of Germ Interval 3.
(in this example: an octave + a minor sixth)





The Germ Intervals can be of any size, but my experience is that the optimal range is from a minor seventh to 2 octaves plus a minor third.

The germ intervals do not have to be confined to the chromatic scale, but I haven't investiged the microtonal possibilities of the crystal chords yet.

Although the principle is extremely simple, I strongly suggest to use a computer to find the best combinations of seed intervals. Many of the combinations are not interesting at all, for instance because they have too many pitches that duplicate eachother. The Macintosh app CrystalChordMaker will soon be available on my website, rolfwallin.org

The algorithm for the crystal chords, written in pseudocode.

```
Root Pitch (Root)
Germ Interval 1 (Int1)
Germ Interval 2 (Int2)
Germ Interval 3 (Int3)
Multiplications of Germ Interval 1 (Mult1)
Multiplications of Germ Interval 2 (Mult2)
Multiplications of Germ Interval 3 (Mult3)
Resulting chord (note[i,j,k])

for i = 0 to Mult1 - 1 {
  for j = 0 to Mult2 - 1 {
    for k = 0 to Mult3 - 1 {
      note[i,j,k] = Root + (Int1*Mult1) + (Int2*Mult2) + (Int3*Mult3)
    }
  }
}
```