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The Bohlen-Pierce Clarinet

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The overwhelming effect of the **Bohlen-Pierce scale** can hardly be understood on the basis of descriptive words. It is the immediate aural impression that opens the doors to this alterate tonal world. Unlike the scales of our usual system, it is not the octave that forms the repeating frame but the **perfect twelfth** (octave plus fifth), dividing it into **13 steps**, according to various mathematical considerations. The result is an alternative harmonic system that opens new possibilities to contemporary and future music.
In 2008, the first acoustic wind instrument using the scale, the **Bohlen-Pierce clarinet**, was premiered. Our repertoire contains some of the first compostitions for two Bohlen-Pierce clarinets as well as works that we commissioned in the past two years. Furthermore, the latest instrument of the Bohlen-Pierce clarinet family, the low-sounding and by now worldwide one-of-a-kind **Bohlen-Pierce tenor clarinet** can be heard in our concerts.
What strikes us most about Bohlen-Pierce music is the possibility to find **completely new soundscapes and aural experiences** within a tonal system. Our experience so far is that the "Western ear and brain" that are used to octave-based scales find it intellectually provoking to think of a tonal system that avoids the octave. On the other hand audiences find it inspiring and stimulating to listen to Bohlen-Pierce music as it is often perceived as a kind of "other-wordly music". Bohlen-Pierce music provides new aesthetic horizons for contemporary music. Through its characteristic of being **a new and unfamiliar, yet harmonic system**, Bohlen-Pierce music has the potential to enrich new music with this special aspect and make contemporary music performances more attractive for a wider public.
Acoustically speaking, the octave's frequency ratio 1:2 is replaced by the ratio 1:3 in the Bohlen-Pierce scale, making the perfect twelfth sound. This interval is defined as the point of reference to which the scale aligns. The perfect twelfth, or as Pierce named it, the tritave (due to the 1:3 ratio) is achieved with 13 tone steps. Accordingly, every single step is sized about a three-quarter tone, in equal temperament exactly 146.3 cents. Simplified, one can imagine this like an elastic band: Instead of achieving the octave after twelve semi-tone steps we stretch the elastic band in order to choose the tritave as the returning point. We hence go about one and a half times as far as before, with almost the same number of steps (13). An alternative harmonic system evolves in which - nota bene - the octave does not appear. Due to the step sizes that differ from the usual, the octave is simply stepped over. However, concerning consonance, the "new" frame, the tritave, ranks second right after the octave due to its similarly simple ratio. The tritave replaces the octave as the perfect interval. Consequently, chord structures evolve that are acoustically different from the ones we are used to.
For example, in our usual tone system the notes of a major chord have the frequency ratio 4:5:6 (root : third : fifth), and it is acknowledged that its harmonic characteristics are almost perfect. The octave is held as the interval which is most consonant. Changing the frequency ratios in order to achieve odd numbered ratios gives a chord with a frequency ratio of 3:5:7, generating a completely different but apparently harmonic chord. This chord cannot be found in the traditional Western scale.
The Bohlen-Pierce scale was discovered in the 1970s and 1980s by three people independently from each other. The first one to investigate the scale was the German microwave and communications engineer Heinz Bohlen in Hamburg. Several years later in California, USA, another microwave and communications engineer, John Robinson Pierce, also discovered the

same scale. Around the same time, the Dutch software engineer Kees van Prooijen worked on the same material.
Sporadically, there have been Bohlen-Pierce guitars and self-made mallet instruments. It was the idea of *Georg Hajdu*, professor of multimedia composition at Hochschule für Musik und Theater Hamburg to apply the scale to the clarinet. He recognized its overblowing of the twelfth and its odd-numbered spectra as ideal conditions. The keen woodwind maker *Stephen Fox* in Toronto agreed to develop a Bohlen-Pierce clarinet. He succeeded, and the first two exemplars were shipped to Hajdu in Hamburg.
Most of the composition teachers at the Hamburg college of music had already been introduced to the Bohlen-Pierce system through Hajdu's long lasting work with it and were pleased to enrich the project with their own Bohlen-Pierce compositions. Two motivated clarinetists were soon found: *Anna Bardeli* and *Nora-Louise Müller* from Lübeck.
At the same time, an ensemble in Ontario, tranSpectra, started preparing for a Bohlen-Pierce concert. Besides two of the new Bohlen-Pierce clarinets, a number of self-made percussion instruments and a malletKAT (an electronic mallet instrument) in Bohlen-Pierce tuning have been used. In March 2008, the world's first two compositions for Bohlen-Pierce clarinets were premiered.
The European premiere of the Bohlen-Pierce clarinet project happened in June 2008 in a concert at Hochschule für Musik und Theater Hamburg, Germany.
Before, the two clarinetists Nora-Louise Müller and Anna Bardeli as well as the participating composers *Georg Hajdu, Manfred Stahnke, Sascha Lemke, Peter Michael Hamel* and *Fredrik Schwenk* had been preparing throughout several months, getting to know the strange and foreign scale. The clarinetists had to work intensively to become acquainted with the unfamiliar technique of the new instrument. Composers and musicians worked together on the new pieces in numerous rehearsals.
Several performances followed: The clarinets were presented in a broadcast concert in Hamburg in the series NDR – das neue werk (NDR – the new work) and in the *Gaudeamus Interpreters Competition* 2009 in Amsterdam as well as in several musicology lectures about the Bohlen-Pierce scale, explaining also psychoacoustical aspects of the scale.
In the meantime, Stephen Fox was not satisfied by the development of the "normal" Bohlen-Pierce clarinet which he calls a BP soprano clarinet. His spirit of research motivated him to create a BP clarinet that sounds in a lower register. Expressed in traditional intervals, it sounds a sixth lower than the soprano clarinet. He named his latest creation a BP tenor clarinet. The instrument was unveiled in March 2010 at the first Bohlen-Pierce symposium in Boston, Massachussetts. It subsequently was given to Àkos Hoffmann and Nora-Louise Müller who were participating as a part of the German delegation. Thanks to the music college in Hamburg (Hochschule für Musik und Theater Hamburg) for purchasing the instrument and committing it to the duo, thereby enriching the work of the Bohlen-Pierce clarinet project in Europe.

Weblinks about the Bohlen-Pierce clarinet:
http://mmm.hfmt-hamburg.de/index.php?id=179 ; the Bohlen-Pierce clarinet project in Hamburg
http://www.transpectra.org/ ; tranSpectra, a group in Ontario using the Bohlen-Pierce scale (currently not active)
http://www.sfoxclarinets.com/bpclar.htm ; Stephen Fox, woodwind maker (Toronto)
http://www.noralouisemuller.de ; that's my webpage. If you have any questions, you are welcome to contact me!
http://www.ziaspace.com/elaine/BP/Background.html ; Elaine Walker does a lot of research in Bohlen-Pierce modes and chords and has developed an enormous theoretical background.
Look up the Bohlen-Pierce scale on wikipedia or become a fan of The Bohlen-Pierce Clarinet Project on facebook.