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Summary - The deep-rooted microtonality of the bass clarinet

The main objective of this research has been to expand the microtonal possibilities of the current unmodified bass clarinet. This study is systematic, practice-led research into the microtonal fingering patterns possible on my closed-key single reed instrument. It is research in, and through, musical practice.

During my career I have, on occasion, been asked by composers to find solutions for microtonal passages in their music. My book, *New Techniques for the Bass Clarinet* (1989), also contained information relating to microtonality. Through the years, my interest in this subject has grown and I felt the need to thoroughly explore this exhilarating subject.

My aims were to research and document bass clarinet fingering patterns for both equal and unequal divisions of the tone. Precision was an important asset during the course of this research: all the fingering patterns have been double-checked to make sure they fall within the set criteria. The fingering patterns have been documented in Appendices B-F. Additional information, regarding any restrictions for their use and the combinability of fingering patterns, has also been included. Demonstration videos have been made of each microtonal scale.

Highly motivated to find out as much as I could regarding the microtonal possibilities of the bass clarinet, I also wanted to explore another kind of microtonality, one which is 'rooted' in the instrument. The harmonic series of the bass clarinet, the way overtones are produced on top of roots, made me aware of the 'inherent' microtonality of the instrument and the additional microtonal options it offers which have been documented in Appendices G1, G2, and G3.

Ample information has been included about playing-parameters, such as embouchure, lower lip position, and air management. These parameters are essential for successful microtonal performance. Several instruction videos were made to illustrate these subjects.

In Chapter 1 all parameters and guidelines relevant to playing the bass clarinet microtonally are discussed and illustrated. Such matters have been included, because a relaxed and flexible embouchure, the control of lower lip positions and articulation, and a proper breathing technique and breath support, all aid successful microtonal playing. An understanding of the root-overtone system of

the bass clarinet and the way the instrument overblows, producing the partials which constitute its harmonic series, is crucial for the creation and production of a different form of microtonality.

Chapter 2 details the development of the bass clarinet from a multiform low clarinet to its current shape and keywork, for which Adolphe Sax is mainly responsible. Sax's technical improvements, such as the addition of a second register key, paved the way, in the long term, for microtonality. Early bass clarinet repertoire is discussed, orchestral, as well as solo and chamber music. These latter categories were scarce until the 1960s, when a revolutionary change took place due to the pioneering work of Eric Dolphy, Josef Horák, and Harry Sparnaay. These three musicians each had a role in the development of microtonality on the bass clarinet.

In Chapter 3 equal divisions of the tone are scrutinized, starting with a review of the existing literature. Most of the information found in the existing sources concerns the quartertone scale. An eighth-tone fingering pattern chart appears in only one source. The reliability and the accuracy of existing fingering patterns is called into question by the results documented in Appendices A1-A3. However, my research demonstrates that it is possible to play many precise quartertone pitches on the bass clarinet, and also to play steps smaller than a quartertone. This research has resulted in both a quartertone and an eighth-tone scale of more than three octaves, determined following strict criteria (Appendices B and C).

Initially inspired by the possibility of duo Hevans performing with the 31-tone Fokker organ in Amsterdam, my duo partner tenor saxophonist Eleri Ann Evans and I were challenged with finding 31-tone fingering patterns for our respective instruments (Chapter 4). At the end of our research we were able to document more than two octaves of 31-tone fingering patterns (Appendix D). The next step in developing my fingering patterns was to try to expand the ambitus of the 31-tone area on the bass clarinet, so that composers would have more possibilities to choose from when writing 31-tone music. As the data shows, the goals I set myself for this development could be met, as both a more precise (Appendix E), and a definitive (Appendix F) 31-tone fingering pattern chart could be established. The ambitus was extended to three octaves, from D₂-D₅.

The term 'the inherent microtonality of the bass clarinet' refers to the instrument's ability to sound microtonal pitch variations by utilizing the notes of the overtone series based on the root fingering patterns from C₁ to B_{♭2}

(Chapter 5). These microtonal variants can be either single, isolated pitches (monophonic), or a cluster of overtones (multiphonic). Root-overtone production clearly demonstrates how bass clarinet harmonics work and is the most direct path to the 'inner' or intrinsic microtonality of the instrument. All the overtones contained in the root pitches of the instrument—from C1 to B $\flat$ 2—have been listed, and vertical and horizontal measurements have been documented (Appendices G1, G2, and G3). Adding keys to the root-overtone pitches further increases the number of microtonal options by producing nano tones (tones with a very small pitch difference of 1-15 cents). Harnessing nano microtonality shows that the root-overtone system is a viable form of microtonal practice and adds another dimension to the sound world of the microtonal bass clarinet.

My practice-based research was undertaken from the joint perspectives of performer, composer, and improviser. Through sharing my data about the microtonal possibilities of the bass clarinet, collaborations with composers have led to new solo and chamber works. The findings also enabled me to strengthen the microtonal elements in my own compositions, as well as in my improvisations.

I hope and expect that the extension of the bass clarinet's microtonal possibilities will enrich the creative processes of bass clarinetists, composers, and other instrumentalists.