

Mikrotöne: Small is Beautiful

- I -

Edited by A. Castilla-Ávila



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Edited by Agustín Castilla-Ávila

**International Symposium:
"Mikrotöne: Small is Beautiful"**

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Hybrid Meloharmonic Structures in Manfred Stahnke's Dramatic Works

Navid Bargrizan

Manfred Stahnke, a key protagonist of microtonal composition, has established microtonal structures as a substantial tool to create not only instrumental but also theatrical music. He has elevated microtonality from a mere structural element to a paramount mode of mediating the philosophical, mythical, and psychological connotations of his music. As a pupil of Ligeti, Stahnke has been significantly influenced by Ligeti's constant curiosity for diverse tonal systems and rhythmical organizations in various musical cultures, as well as his experiments with intonation and tuning. In the late 1970s, Stahnke also studied in the United States with the microtonalist Ben Johnston, who had worked closely with Harry Partch. Therefore, we can draw a direct lineage between Partch, Johnston, and Stahnke on one hand, Ligeti and Stahnke on the other. Although both Partch's and Johnston's just intonation and Ligeti's view of the process of composition as analogous to scientific research have had major imprints upon Stahnke's thinking, his personal hybrid, flexible, and non-dogmatic compositional approach has evolved.¹ In his own words:

Basically, I do not tend to work within the tradition of the European microtonality (e.g. Hába, Wyschnegradsky, and others), but rather the American one (Partch and Johnston). [...] Yet, I dismiss Partch's idea that the pure intervals could be precisely-realized without any beating. On the contrary, through working with computers, I have experienced that un-purity, to some extent, enlivens sound. With his chromelodeon (a re-tuned reed organ), Partch intended to generate pure sounds, up to the eleventh partial. I believe that the absolute purity of intervals is just a utopia.²

We can interpret Stahnke's compositional approach as a constant effort to avoid being limited by any compositional or artistic ideology, and avoiding mannerisms. Stahnke's experiments with microtones, intonations, and tunings are utterly in line with his music philosophy. He does not confine himself within the boundaries of twelve-tone equal temperament, other renderings of equal temperament, or just intonation. He is steadily in search of new tonal structures inspired by folk musical traditions in combination with the possibilities that the spectrum of partials grants him, while experimenting with electronics, micro-rhythms, tunings, intonations, and other kinds of equal temperaments.

The crux of Stahnke's hybrid microtonal mindset is the concept of meloharmony, a term that Stahnke himself has coined. He explains this concept as follows:

"Meloharmony is a word that I came up with to denote the interrelationship of vertical and horizontal pitch organization within an open microtonal field. By definition, this field is open to every aspect of pitch organization; interval relationships may exist within this field regard-

¹ See Manfred Stahnke, "György Ligeti und Manfred Stahnke: Gespräch am 29. Mai 1993" in *Musik - nicht ohne Worte*, ed. Manfred Stahnke (Hamburg: Von Bockel, 2000, 121-152).

² Manfred Stahnke, "Mein Weg zu Mikrotönen", *Musik-Konzepte-Musik der anderen Tradition: Mikrotonale Tonwelten*, Sonderband (2003, 129).

³ Manfred Stahnke, 2007, "Hybrid Thinking in Meloharmony" in *Proceedings of the International conference Composer au XXIe Siècle - Processus et Philosophies*, 2007, 1-17. Montreal (Quebec, Canada).

less of whether or not they are also related to older forms of melodic-harmonic relationships. The only restriction lies in the avoidance of addressing "anonymous" fields, where neither horizontal nor vertical pitch relationships play a distinct role"³ (footnote on page 60).

Concentrating on Stahnke's concept of meloharmony, this paper demonstrates the vertical and horizontal interrelationships of micro-intervals in Stahnke's Internet-opera *Orpheus Kristall*. Furthermore, while giving an overview of Stahnke's other major dramatic works, I articulate the ways in which Stahnke's microtonal fabrics correlate with his own aesthetic beliefs and essential implications of the dramatic narrative in his operas.

In *Orpheus Kristall*, produced by the Munich Biennale 2002, Stahnke's meloharmonic construction rests upon a finely-tuned system of fifty-three tones to octave, *Differenztonharmonik* (difference-tone Harmony), and extensive micro-glissandi to characterize Orpheus' inner-battle within his technological world. In this opera, Stahnke extends the boundaries of the live music on stage through integration of remote musicians via the Internet as an essential part of the performance medium. His multifaceted microtonal construction and his innovative approach to incorporating digital media to expand the scope of the stage-music underpin the entire opera, which address various philosophical and cultural issues; for instance, the issue of how our live is nowadays, strictly-linked to the outer world through internet. In this opera, Orpheus is lost in the complexity of a multimedia and microtonal world. Stahnke builds an analogy between Orpheus' autism and the non-fixed, fluid world of microtones in his microtonal system. Orpheus' endeavor to overcome the cold "Kristall" (crystal) of his corrupted, non-functioning inner-world by grasping onto the external worlds Internet-sounds, is akin to the composers desire to break through the limited scope of equal temperament, as well as his attempt to expand the narrow reach of the immediate stage through internet.

Stahnke's use of the term *Kristall* was motivated by the Austrian physicist, Erwin Schrödinger's concept of "aperiodic crystal." During an era before the biological structure of the human-DNA was fully exposed, Schrödinger proposed the concept of "aperiodic crystal" as the molecular material carrier of life, in his seminal 1944 book *What is Life?*⁴ He juxtaposes this concept, which stands for the rather complicated and non-repetitive structure of a gene, and the rigid and plain structure of the natural "periodic crystals" as it was already understood in the physics. In Schrödinger's words:

"An organisms astonishing gift of concentrating a "stream of order" on itself and thus escaping the decay into atomic chaos - of "drinking orderliness" from a suitable environment - seems to be connected with the presence of the "aperiodic solids", the chromosome molecules, which doubtless represent the highest degree of well-ordered atomic association we know of - much higher than the ordinary periodic crystal - in virtue of the individual role every atom and every radical is playing here."⁵

Stahnke takes the complicated, rigorous structure of "periodic crystals" as a metaphor for his intricate, microtonal system, which comprises fifty-three tones to octave. Regarding to the analogy between crystals and tone systems as well as the limitations of the twelve-tone equal

⁴ Erwin Schrödinger, *What is Life? The Physical Aspects of the Living Cell*, (Cambridge: Cambridge University Press, 1944)

⁵ Schrödinger, *What is Life?*, 77

⁶ Stahnke, M., "Ein Tonsystem für eine Internetoper," *Positionen: Beiträge zur neuen Musik* 28 (2001), 27.

temperament, Stahnke mentions: "How are we able to deal with an Internet opera which includes building crystals (tone systems) and Internet? Tone systems are analogous to crystals. In this omnivorous Europe, the crystal is already very old (our great-grandfather: the twelve-tone equal temperament)."⁶ Stahnke employs the scale of fifty-three tones to octave for the improvisation of the remote-musicians in *Orpheus Kristall*.

The second significant microtonal element in the opera is the slow, long micro-glissandi, where we can experience a diverse and constantly-morphing microtonal world (See Example 1.) In Stahnke's words:

"This is the idea of a gradual shifting of intervals, which slowly produce new harmonies. I find this interesting, because, as many voices slide simultaneously, sometimes, they generate simple pure chords. Let us imagine that I take a major third, then I slowly slide to a narrow fourth; then, I gradually arrive in an equal-tempered fourth, where all the tones fall in a simple chord: I come from a familiar sound structure to a vibrating and strange one, and then again fall in a new simple chord. This morphing fourth produce various difference and summation-tones as well. Exactly, these transitions interest me."⁷

The extensive use of micro-glissandi in *Orpheus Kristall* informs the constantly-mutating thoughts of the autistic Orpheus. Stahnke explains the relationship of this microtonal element to the story-line (if there is such thing as story-line, in this opera) as follows: "There is the threshold of form-recognition in the constantly-mutating meloharmonic image as a consequence of micro-glissandi and pulse-fluctuations - as if Hades is the world of 'formlessness,' and as if 'form' comes from an inaccessible, different world."⁸ The scale consisting of fifty-three tones to octave used by the remote-musicians and micro-glissandi used by the stage-orchestra are therefore the most essential elements in the tonal construction of this opera (see Example 1).

Alongside juxtaposition of the stage- and Internet-music, these tonal elements create contrast between the notions of "formlessness" and "form." Orpheus desperately desires to reach his now-dead, formless Eurydice. Hence, he travels to the Hades, where the distinction between form and formlessness is not as clear. He nearly regains his Eurydice, but he loses her again, and therefore loses himself as well. This dichotomy between form and formlessness is conceived throughout the work by means of a contrast between the realm of half and whole tones and the domain of microtones, all of which is amplified by the improvisatory world of Internet-sounds, in contrast to the stage-produced sounds. To realize the dichotomy of form and formlessness in the music, Stahnke expands the world of fixed half and whole tones to a world of endless tones, where the tone is an unfixed phenomenon. By allegorical adoption of a multi-layered microtonal structure, Stahnke breaks the barrier of the equal temperament that had characterized our somewhat limited world of the tempered fixed tones.

In earlier pieces such as his fourth string quartet, titled *Schrödingers Kristall*, inspired by Schrödinger's concept, Stahnke applies his system of difference-tone harmony, extensively. In *Orpheus Kristall*, Stahnke's meloharmonic construction also rests upon difference-tone harmony (see Example 2). This notion refers to what happens in our ears when we hear any interval. As soon as we hear an interval, its summation-tone (*Summationston*) emerges as overtones, and

⁷ Navid Bargrizan, "Aspekte Mikrotonaler Komposition" (Master's Thesis, University of Hamburg, 2012, 111).

⁸ Stahnke, M. "Orpheus unter den ganzen Zahlen - ein Essay über Schwellen" in *Melodie und Harmonie? Festschrift für Christoph Hohlfeld zum 80. Geburtstag*, ed. R. Bahr (Berlin: Weidler, 2000, 196).

Stille *prestissimo* *wie Vogelflattern*
 ♩=40 oder *libre Perc.* ♩=140 sub. ♩=80

84 85 86 87 88 89

Fl. *ppp* *f* *ppp*

Cl. *p*

Mok. *solo* *ff*

Bar. *p*
als

Vl.1 *sul pont.* *ff*

Vl.2 *sul pont., microgliss.* *ff*

Vl.3 *sul pont.* *ff*

Va.1 *sul pont., microgliss.* *ff*

Va.2 *sul pont.* *ff*

Va.3 *sul pont.* *ff*

Kb. *sul pont.* *pppp* *ff*

E (Zw)ischenwert H

Example 1. Manfred Stahnke, *Orpheus Kristall*, act I, Measures 84-89. Micro-glissandi in the strings, microtonal deviations, and the difference-tone chords; the fundamental tones are stated below the staff. Reproduced with the permission of the Stahnke-Verlag.

V - 22

The musical score is for measures 123-128 of Manfred Stahnke's *Orpheus Kristall*, scene V. It features a variety of instruments: Flute (Fl.), Clarinet (Cl.), Trumpet (Trp.), Pos. 1, Pos. 2, Violin 1 (Vl. 1), Violin 2 (Vl. 2), Violin 3 (Vl. 3), Viola 1 (Va. 1), Viola 2 (Va. 2), Viola 3 (Va. 3), Violoncello 1 (Vc. 1), Violoncello 2 (Vc. 2), Violoncello 3 (Vc. 3), and Kontrabaß (Kb.). The tempo markings are $J = 120$, $J = 180$, and $J = 140$. The dynamic markings range from ff to ppp . The fundamental tones are indicated below the staff: E, D, C, Zw, D, Zw.

Example 2: Manfred Stahnke, *Orpheus Kristall*, scene V, measures 123–128. Difference-tone chords; the fundamental tones are stated below the staff. Reproduced with the permission of the Stahnke-Verlag.

its quadratic as well as its cubic difference-tones (*Differenztöne*) emerge as undertones. We are only able to perceive these naturally-occurring psychoacoustical phenomena in specific acoustic conditions accompanied by enough amplification, correct intonation, and the lack of vibrato. Taking any ratio (f_2/f_1) from the overtone-series (f_2 has a higher frequency than f_1), the quadratic difference-tone of this ratio is f_2 minus f_1 ($f_2 - f_1$). For example, as illustrated in Example 3, based on C2 as fundamental, its eleventh overtone (f_2) is F#5 -49 cents, or the natural tritone (11/8), which is about a quarter-tone (50 cents) smaller than equal tempered tritone. On the other hand, its seventh overtone (f_1) is Bb4 -31 cents, or the natural minor seventh (7/4), which is about one-sixth tone (33 cents) smaller than the equal tempered minor seventh.

Q. D. T. F1 F2 S. T.

4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

-14 2 -31 4 -14 -49 2 41 -31 -12 5 4 -2 -14 -29

1 2 3
2 2

- The numbers above the notes indicate the numbers of the partials.
- The numbers below the notes combined with the accidentals indicate the cent-deviations from the equal temperament.
- Q. D. T. stands for quadratic difference-tone.
- S. T. stands for summation-tone.

Example 3: Overtone series of the fundamental tone C2, up to the twenty-first overtone. This figure indicates the quadratic difference-tone and the summation-tone of the ratio f_2/f_1 .

C. D. T. F1 F2

4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

-14 2 -31 4 -14 -49 2 41 -31 -12 5 4 -2 -14 -29

1 2 3
2 2

Example 4: Overtone series of the fundamental tone C2, up to the twenty-first overtone. This figure indicates the cubic difference-tones of the ratio f_2/f_1 . (The numbers above the notes indicate the numbers of the partials / The numbers below the notes combined with the accidentals indicate the cent-deviations from the equal temperament / C.D.T. stands for cubic difference-tones)

According to the formula $f_2 - f_1$, the quadratic difference-tone of these two frequencies sounding harmonically is $11 - 7 = 4$, the fourth partial which is C4. The summation-tone of these two frequencies ($f_1 + f_2$) is $7 + 11 = 18$, in this case the eighteenth partial, which is D6.

A bit more complicated and not as well-known is the phenomena of cubic difference-tone

($2 \cdot f_1 - f_2$), which actually is not just one tone, but a cascade of difference-tones consisting of the undertones of any ratio based on a specific fundamental. Take, for example, the ratio 11/10 (tenth partial is E5 based on the fundamental C2), the first cubic difference-tone is $2 \cdot 10 - 11 = 9$, which is D5 -4 cents. Then if we take D5 as f_2 , the next cubic difference-tone in the cascade will be $2 \cdot 9 - 10 = 8$, which is C5. If we keep on calculating according to the same formula, the rest of the cubic difference-tone will be: $2 \cdot 8 - 9 = 7$, $2 \cdot 7 - 8 = 6$, $2 \cdot 6 - 7 = 5$, $2 \cdot 5 - 6 = 4$, $2 \cdot 4 - 5 = 3$, $2 \cdot 3 - 4 = 2$, $2 \cdot 2 - 3 = 1$. Here (see Example 4), we observe that all the undertones of the ratio 11/10 build a cascade of cubic difference-tones (the ninth, eighth, seventh, sixth, fifth, fourth, third, and the second partials, as well as the fundamental tone itself).

Extending the scope of his microtonal system, throughout *Orpheus Kristall*, Stahnke uses this psycho-acoustical phenomenon and builds just-intoned chords based on both sorts of the difference-tones, constructing the harmonic structure of the opera. In other words, his harmonic system makes us perceive consciously what we most often, unconsciously hear. One of the important reasons for the persistence of the composer to revive the predominance of the natural tones in *Orpheus Kristall*, which sound to our ears ironically unnatural and strange, and to base his whole meloharmonic construction upon this just intonation, is the presence of the element of nature in the Orpheus myth and its relevance in the conception of the opera. A duality arises from the conflict of the indefinite, improvisatory world of Internet sounds, and the definite, intricately-built microtonal system of this opera. In fact, duality is a constant present notion throughout the opera: duality of the ancient myth and the modern, technological world; duality of our solid universe (or multiverse) and the underworld (Hades); duality of the world of fixed-tones and the realm of non-fixed, finely-tuned tones.

Prior to *Orpheus Kristall*, Stahnke had employed microtonal structures and technology as integral parts of the dramatic narrative, in his three other music-theatrical pieces. His 1982 *Wahnsinn, das ist die Seele der Handlung (Madness is the Spirit of the Plot)*, last produced at the Berlin State Opera in 2012, is a sophisticated collage of Edgar Allan Poe's poems for string quartet, female voice, and electronics. *Wahnsinn*, as a surreal psychogram, articulates the inner psychological challenges of the main female character. In *Wahnsinn*, the prevalent just intonation, pre-recorded and live-electronics, and the literary sources that Stahnke builds upon are of a very different nature than *Orpheus Kristall* (see Example 5). In *Orpheus Kristall* Stahnke tackles philosophical issues, in *Wahnsinn* he crafts a psychological narrative to which the microtonal and technological structures contribute.

Stahnke's other chamber opera, *Der Untergang des Hauses Usher (The Fall of the House of Usher)*, also commissioned by the Kiel Opera, was premiered 1981. Stahnke designed this work after Edgar Allen Poe's 1839 novel of the same name, as well as an assortment of Poe's other poems. Here, Stahnke employs synthetic sounds and complicated microtonal structures based on just intonation, to evoke an intricate web of psychological issues implied in Poe's plot, such as hypochondriasis, hysteria, and melancholy, as well as its grotesque aspects such as incest, vampirism, and horror. In this opera, Stahnke's meticulous microtonal structures are analogous to the so-called notion of "totality" of Poe's text, where every element and all details are interwoven and relevant.

In all of these four dramatic works, Stahnke's integration of digital media and electronic enhance the function of his meloharmonic construction in the dramatic narrative. According to Stahnke's multi-dimensional approach to the art, he creates new opera concepts, which rests upon incorporating and synthesizing the following elements: innovative intervallic and harmonic ideas; improvisation; electronic sounds; and digital media; all the while basing this

construction on an elaborated versions of literary sources, which contain philosophical, psychological, and existential connotations. Stahnke appoints an essential role for the meloharmonic structures as well as technological devices, in the context of his hybrid operas.

GALAMUSIK

Solistin:
und keine Sorge -
das Narrendrama
soll nicht vergessen werden

schneller
♩ = 84

Solistin:
mit seiner Phantomjagd
nach immermehr

tempo
♩ = 60

Nat. terz zu Ve
(h 9. über A)
Nat. terz
über A
(11. über A)

Example 5: Manfred Stahnke, *Wahnsinn, das ist der Seele der Handlung*, prelude, measures 1-12. Composer demands Just minor-sevenths. Reproduced with the permission of the Stahnke-Verlag.

Manfred Stahnke 1986 / rev. 2015
Heinrich der Vierte
 nach Luigi Pirandellos "Enrico IV"
 in Form einer Schauspiel-Oper, "aus der Zeit gefallen"
Partitur in C

Mathilde - Sopran ca. 40 Jahre, liebte in ihrer Jugend Heinrich, liebt ihn noch, lebt aber zusammen mit:
Belcredi - Tenor ca. 40-50, stach vor 20 Jahren Heinrich vom Pferd
Heinrich - Bariton ca. 40-50, lebt seither als vermeintlicher "Irre"
Freya - Soubrette ca. 20, Tochter Mathildes, verlobt mit:
diNolli - Tenor ca. 25, Neffe Heinrichs, managt das "Irrenhaus"
Doktor - Sprechstimme gerade zur versuchten "Heilung" Heinrichs engagiert

Vier Diener, im "Irrenhaus" angestellt:
Landolf - Tenor
Bertold - Bariton Neankömmling, soll eingewiesen werden
Ordulf - Bass
Giovanni (Nebenrolle) Altmännerstimme Bass

Kammerorchester - auf der Bühne:
 Fl. (auch Picc.) Ob. Kl. (auch Es- und Basskl.) AltSax. (evtl. = Kl.-Spieler) Fag. Trp. Pos.
 Harfe, Synthesizer (evtl. = 2. Schlagzeuger), 2 Schlagzeuger
 2 Vl. Va. 2 Vc. Kb. (alle solistisch)

UA Opernhaus Kiel 1987
 Dauer ca. 90'

Spezielle Vorzeichen (außer Harfe): Pfeile ca. 30 Cent; 1/680Hz
 Alle Vorzeichen gelten "klassisch" für den ganzen Takt

Harp Grundstimmung (dazu normale Oktavierungen)
 5/4 Große Tere 7/4 Kleine Septime 5/4 Große Tere
 Centabweichungen:
 0C -14C -31C -14C -28C -45C -28C -42C -59C

Example 6. Manfred Stahnke, *Heinrich IV*, title page, includes the roles, the instrumentation, and the harp's tuning based on just major-thirds and just minor-seconds. Reproduced with the permission of the Stahnke-Verlag.

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The articles in this book are selected papers presented at the first international symposium "Mikrotöne: Small is beautiful" at the University Mozarteum in Salzburg, organized by the International Ekmelic Music Society (IGEM).

The International Ekmelic Music Society was founded in 1981 by Franz Richter Herf and Rolf Maedel and caused Salzburg to become a new center of microtonal music.

It was considered necessary to coordinate future artistic and scientific activities in the form of a society.

Die Artikel in diesem Buch basieren auf Präsentationen beim ersten internationalen Symposium "Mikrotöne: Small is beautiful" an der Universität Mozarteum in Salzburg, organisiert von der Internationalen Gesellschaft für Ekmelische Musik.

Die Internationale Gesellschaft für Ekmelische Musik wurde 1981 von Franz Richter Herf und Rolf Maedel gegründet und hatte Salzburg zu einem neuen Zentrum mikrotonaler Musik werden lassen. Es ergab sich die Notwendigkeit, künftige künstlerische und wissenschaftliche Aktivitäten in der Form einer Gesellschaft zu koordinieren.

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