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# Explorations of Equal-Tempered Microtonality

Robert Hasegawa

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Two recent publications—Rosalie Kaplan’s new English translation of Ivan Wyschnegradsky’s *Manuel d’harmonie à quarts de ton* and Julia Werntz’s pedagogical guidebook *Steps to the Sea*—bookend nearly a century of microtonal composition. Their appearance is timely: while only a few decades ago many composers and performers regarded microtones as exotic and virtually unplayable, today quarter tones (and to a lesser extent other microtonal inflections) have become commonplace in contemporary music of many aesthetic inclinations. One could well ask whether “microtonal” remains a useful term to categorize music by composers as diverse as Partch, Grisey, Ferneyhough, and Oliveros. Following Georg Friedrich Haas, we can distinguish between several distinct theoretical approaches to microtonality: just intonation (with intervals based on simple frequency ratios), equal division of the octave (creating micro-

tonal equal temperaments), use of traditional or newly invented scales, spectral music, and *Klangspaltung* (“sound splitting”)—not to mention aleatorically generated microtones and various hybrids of these options.<sup>1</sup>

Though both Wyschnegradsky and Werntz derive their microtones through the equal division of the octave, this apparently straightforward procedure can mean different things for different practitioners: for some, a microtonal equal temperament is a grid that approximates underlying acoustic phenomena such as frequency spectra or just intonation intervals, while others (like the authors discussed here) seek to draw out the unique acoustic, expressive, and combinatorial properties of the newly available intervals. Though equal temperaments based on the division of the octave into prime numbers like 19 and 31 have been proposed (primarily for their approximation of certain just intervals), both Wyschnegradsky and Werntz depart from the standard twelve-tone equal temperament, subdividing it further to yield quarter tones (24 per octave), sixth tones (36 per octave), or even twelfth tones (72 per octave). Such divisions have the advantage of building on musicians’ familiarity with the basic twelve-tone chromatic while adding new notes—though just intonation advocates might argue that these added divisions do little to refine the

tuning of the standard tempered scale. Both authors avoid ideological rhetoric—such as an insistence on the “naturalness” or acoustical correctness of their system—choosing instead to offer non-systematic guidelines and advice for harnessing the richness of these new pitch and intervallic resources.

A relatively early work, first published in 1932, Wyschnegradsky’s *Manual of Quarter-Tone Harmony* concerns itself only with the use of quarter tones, not the finer divisions that occupied the composer later in his career.<sup>2</sup> Rosalie Kaplan’s translation of the *Manual* is clear and faithful to the original, and this edition is further enhanced by a web companion by Christopher Douthitt that includes audio realizations of every musical example. This brief guidebook is arranged, in editor Noah Kaplan’s words, “in stages corresponding to the development of Western harmony,” starting with examples departing from common practice tonality. After a quick introduction to the new intervals and their names (such as the neutral

second halfway between minor and major, and the major fourth, a quarter tone wider than the perfect fourth), Wyschnegradsky offers his first musical examples: quarter-tone appoggiaturas and neighbours to standard major and minor triads. In this traditional context, quarter tones can also appear as passing tones, or in alterations of triads and other tonal chords or scales. These resources are quickly developed into full four-voice harmony, including modulations between distant keys such as F and B quarter-flat. According to Wyschnegradsky’s preface, one goal of the book is “to prove that quarter-tone music did not appear from out of the blue but is the ripe fruit of musical evolution.” Charting this evolution means “proceeding in the domain of quarter tones as music history proceeded with semitones”: his newly invented examples offer an alternative history of Western music, seeking to normalize the usage of quarter tones and lend them a respectable pedigree. Indeed, the matter-of-fact tone of the prose underplays the novelty of these modulations and harmonizations, treating them as if they were part of an established and fully accepted musical practice.

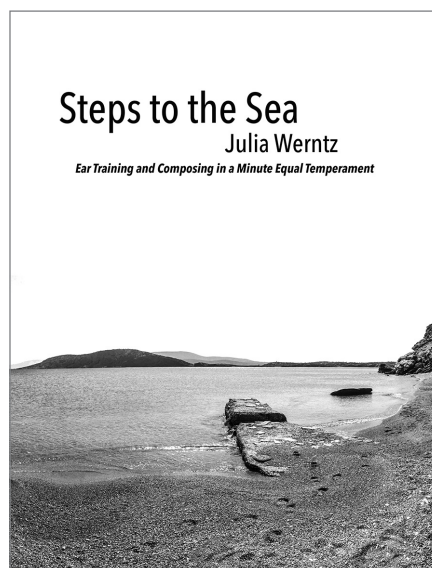
The second part of the *Manual* turns to “quarter tones as an organic part of the musical system.” No longer tied to a tonal past, Wyschnegradsky offers new quarter-tone resources that echo the developments of the early twentieth century, from “artificial” quarter-tone scales through polytonality to conclude with atonality and tone clusters. The scales are divided into various types: regular (cycles of a single interval, such as the repeated neutral second), semi-regular (built of a single repeated cell, like Messiaen’s “modes of limited transposition”), or irregular. A few of Wyschnegradsky’s examples foreshadow his essential later notion of non-octaviating scales, introducing scales that repeat their interval pattern at intervals such as a minor ninth quarter-low ( $12\frac{1}{2}$  semitones) or a neutral sixth ( $8\frac{1}{2}$  semitones) instead of at the octave. One of Wyschnegradsky’s most fruitful scalar ideas is the



“chromatic scale diatonicized to thirteen tones”: just as the diatonic scale can be derived from a cycle of perfect fifths, this scale can be derived from a cycle of major fourths. Wyschnegradsky’s cycle of twenty-four preludes in each of the “keys” of this scale (opus 22) was published just a few years after the *Manual* and is a good illustration of his “diatonicized chromaticism” (though he later would regard this as merely a step towards his work with cyclic and non-octaviating spaces).<sup>3</sup>

The *Manual* closes with “The Free Use of Quarter Tones,” drawing on the consequences of atonality and Schoenberg’s emancipation of dissonance. “The composer has complete sovereignty and freedom with regard to their musical material, which demands a mature sense for creating an internal order within apparent disorder,” (p. 24) Wyschnegradsky writes; the limitless possibilities of such freedom mean that “any law is impossible in this domain” (p. 24). In place of laws or theories, Wyschnegradsky offers inventive compositional techniques such as the “expressive unison” (*unisson expressif*): the substitution of a quarter-tonal second (or even a cluster of quarter tones) for a unison, blurring and adding activity to a tone (which has clear implications for the later music of Giacinto Scelsi, Pascale Criton, and Georg Friedrich Haas).

Julia Werntz’s *Steps to the Sea: Ear Training and Composing in a Minute Equal Temperament* shares with Wyschnegradsky’s *Manual* an intentional avoidance of theoretical dogmatism. In a discipline that is often highly speculative, *Steps to the Sea* is appealingly practical, particularly given the complexities of the microtonal system it explores. Drawing on deep experience as a composer and pedagogue, Werntz provides guidance through the immense “sea” of intervallic and harmonic possibilities offered by the division of the octave into 72 equal parts (twelfth tones), equivalent to the finest-grained division proposed by Wyschnegradsky in his 1972 article in *La Revue musicale*. Twelfth tones split each semitone into six equal



parts, each equivalent to about 17 cents (hundredths of a semitone); this fine grid can incorporate a wide range of microtonal scales, including sixth tones, quarter tones, and even third tones. Werntz adopts a strain of equal tempered microtonality pioneered by Ezra Sims and her former teacher Joe Maneri and promoted for decades by the Boston Microtonal Society (of which Werntz has served as the longtime Artistic Director). The unique approach of these composers has emphasized richly detailed melodic writing: the refinement of the intervals seems to favour a concentrated approach to melody in which each interval bears considerable meaning, and there is an enriched awareness of the directional tendencies of every tone.

*Steps to the Sea* grew out of a microtonal ear training course offered at New England Conservatory, initiated by Maneri in the late 1970s and continued by Werntz. The new volume replaces Maneri’s earlier textbook (co-authored with Scott Van Duyne) in a completely rewritten format—the main updates promote an increased focus on listening and ear training, emphasizing the audibility and comprehension of the new intervals.<sup>4</sup> *Steps to the Sea* prioritizes the

aural recognition and vocal or instrumental production of microtones, not only through exercises but also through composition. Students are encouraged from the earliest stages to invent their own motive- and scale-based melodies, first with quarter-tone intervals, then sixth tones, twelfth tones, and finally with all of these systems freely mixed. The notation follows Ezra Sims: three types of arrows, representing alteration by a twelfth tone, sixth tone, or quarter tone, are used in combination with standard accidentals.<sup>5</sup> Intervals are named with a similar emphasis on practicality: rather than inventing new names for every interval, Werntz uses numerical values in cents: for example 233 (a major second widened by a sixth tone) or 583 (a tritone narrowed by a twelfth tone). The introduction of new intervals and compositional techniques is carefully calibrated, gradually introducing two-voice counterpoint (first in a note-against-note, “first species” texture, then in free rhythm) and more fine-grained intervals. Twelfth tones arrive last, with exercises in “micromelodic phrases,” first restrained within a narrow range (no more than 150 cents), then expanding to include larger intervals as well. As Werntz notes, larger “twelfth-tonal” intervals pose the most critical questions of audibility, with an overall effect that can be both “subtle and fragile.”

Despite the decades that separate them, *Manual of Quarter-Tone Harmony* and *Steps to the Sea* adopt similar attitudes, seeking to sketch out fruitful approaches to the “immensely expanded expressive possibilities” of microtonality while “deliberately sidestepping” theory to “give precedence instead to the practicing musician’s point of view” (Werntz, p. 1). In both books, the relationship of the new microtonal intervals to the overtone series and just intonation frequency ratios is mentioned only briefly in footnotes or appendices. Rather than justifying these new resources through an appeal to acoustics, Werntz turns instead to the intuitive response of the musician: “Is it really safe to

assume... that we will always *hear* 383 cents (close to the 5/4) as a more correct major third than 400 cents or 367 cents?” (p. 12) Setting aside the construction of theories allows both authors to examine the artistic potential of their materials with an open mind, privileging creative exploration and the pleasure of unexpected aural discoveries.

1. Georg Friedrich Haas, “Mikrotonalität und spektrale Musik seit 1980,” in *Orientierungen: Wege im Pluralismus der Gegenwartsmusik*, edited by Jörn Peter Hiekel, Mainz, Schott, 2007, p. 123–29.

2. An earlier translation of the *Manual* by Ivor Darreg is out of print and difficult to find. While the other major writings of Wyschnegradsky remain largely unavailable in English, readers of French have access to an increasing amount of literature on the composer. A good overview is Pascale Criton’s chapter “Continuum sonore et espaces périodiques: L’ultrachromatisme d’Ivan Wyschnegradsky,” in *Théories de la composition musicale au xx<sup>e</sup> siècle*, edited by Nicolas Donin and Laurent Feneyrou (Lyon, Symétrie, 2012, p. 281–300). Wyschnegradsky’s later theories are laid out in two major texts: *La Loi de la pansonorité* (Geneva, Contrechamps, 1996) and “L’ultrachromatisme et les espaces non octavians” (*La Revue musicale*, n° 290–291, 1972, p. 73–130). For additional context, see the recent volume *Libération du son: Écrits 1916–1979*, edited by Pascale Criton (Lyon, Symétrie, 2013), reviewed in this journal by Sharon Kanach (vol. 24 n° 3, 2014, p. 88–91).

3. Ivan Wyschnegradsky, *24 Préludes en quarts de ton pour deux pianos, dans l’échelle chromatique diatonisée à 13 sons*, Frankfurt, M. P. Belaieff, 1977. The preludes were first composed in 1934, then revised by the composer in the 1960s and ‘70s.

4. Joe Maneri and Scott Van Duyne, *Preliminary Studies in the Virtual Pitch Continuum* (Plainview, NY: Accentuate Music, 1986). An earlier edition of Werntz’s book was published in the volume *1001 Microtones*, edited by Sarvenaz Safari and Manfred Stahnke (Hamburg, von Bockel Verlag, 2014). Like the Kaplan translation of Wyschnegradsky’s *Manual*, this new edition of *Steps to the Sea* has a substantial online component, with downloadable audio files and supplemental PDF examples.

5. Ezra Sims, “Reflections on This and That (Perhaps A Polemic),” *Perspectives of New Music*, vol. 29, n° 1, 1991, p. 236–57. Sims’s music has some striking similarities to Hans Zender’s later music, particularly in the combination of 72-tone equal temperament with harmonies built through the sums and differences of their component frequencies—see Robert Hasegawa, “*Gegenstrebigkeit Harmonik* in the Music of Hans Zender,” *Perspectives of New Music*, vol. 49, n° 1–2, 2011, p. 207–34 and Zender’s recently published *Essais sur la musique*, edited by Pierre Michel and Philippe Albera, with translations from the German by Martin Kaltenecker et Maryse Staiber.