



Fractional Set Theory: A System for the Analysis of Microtonal Music

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This paper introduces a system for the representation of microtonal pitch classes for the purposes of transcription, analysis and performance. When scales encountered in World Music do not use twelve-tone equal temperament (12TET), another system for analysis of is needed. Fractional Set Theory (FST) applies the traditional techniques and principles of set theory to music containing microtones. FST preserves the mod-12 system most familiar to performers, composers and theorists by using decimal fractions to represent any microtone. If a non-Western scale is related to a Western scale, but with microtonal inflections, FST quantifies those inflections and makes them more recognizable to theorists, ethnomusicologists and performers. If the scale is not related to a Western one, FST will still represent the microtonal pitch classes as a number in mod-12. Several examples of scales are given (e.g., Hijaz, Zalzal, Rast maqam, etc.). Examples from compositions by Western composers who use microtones are also included in order to further demonstrate the uses of FST. The specificity of the transcriber's or composer's notation and performance directions determines the exactitude of the fractional representation. Like pitch classes, microtonal interval classes are represented in decimal format in FST. This is particularly useful to performers learning unfamiliar intervals, ethnomusicologists transcribing unfamiliar intervals, and theorists studying microtonal relationships. As many scales found in cultures around the world are based on overtone ratios, several interval classes commonly found

within the overtone series are included in the paper. The term “half harmonic” is defined and demonstrated using pitches that are harmonics of a fundamental at least one octave below the first note of the scale. The issue of overly complex interval class vectors is addressed.

Enharmonics in microtonal music notation can be troublesome, so the system uses "binomial representation" for microtonal pitch and interval classes.