Music Notation as Analysis

Nicolas Meeùs*

The question that I want to raise is not whether the term "music", in the expression "music analysis," necessarily refers to its score, nor whether a score is needed to perform an analysis, but whether the score can (or must) be considered an analysis of the music that it records. My purpose is to defend the idea that notation itself, whether as part of the compositional process or as record of a music already performed, always achieves some kind of analysis, or of pre-analysis of the work that it concerns. My paper, in short, is about notation.

It is well known that notation in general and Western notation (staff notation) in particular do not record all aspects of music. Notation is not a representation of the musical sound and never claimed to be such a representation. Curt Sachs, in *The Rise of Music in the Ancient World*, obviously speaking of vocal music, describes two sides of ancient melodies, one "logogenic" and the other "pathogenic". Logogenic music, he says, is "word-born", it is used "as a mere vehicle for words", while pathogenic music "is due to an irresistible stimulus that releases the singer's utmost possibilities."[1] What interests me most in this is that Sachs adds, in his posthumous work *The Wellsprings of Music* (1962), that the ones (the pathogenic melodies) "can hardly be transcribed in the neat notation of the West**,"** while the others (the logogenic ones) "are less turbulent and at a pinch accessible to our five-line staffs."[2] This already indicates that notation concerns the "linguistic" – or let's say the semiotic aspects of music.

Leonard Meyer, in "A Universe of Universals" and in other writings before, considers that music includes "syntactic" parameters, mainly pitch and duration (rhythm, meter), and "statistical" parameters, among which he quotes dynamics, tempo, "sonority" [?], and timbre.[3] Even if Meyer does not stress this aspect, it is obvious that while syntactic parameters are more or less precisely recorded in notation, the notation of statistical parameters is much less precise; it is of the order of what we call in French *didascalies*, verbal instructions for the player. And the syntactic aspects, once again, belong to the semiotic aspect of music, while the statistical aspects mainly concern performance.

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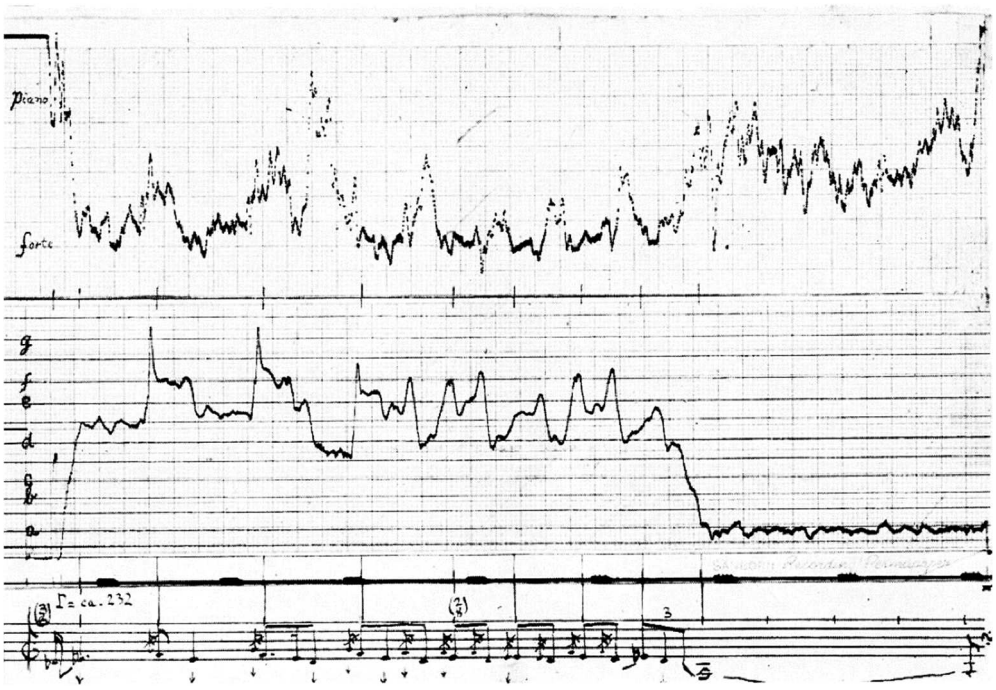
[1] "The music considered so far is *logogenic* or word-born. Men […] actually use the melody as a mere vehicle for words […]. But this is only one side of primitive music. For music is often due to an irresistible stimulus that releases the singer's utmost possibilities. Not yet able to shape such *pathogenic* music in premeditated longer patterns with the climax in the middle or at the end, he lends all his force and passion to the beginning of his song and lets the melody drop as his vocal chords slacken, often passing to a scarcely audible pianissimo." Curt SACHS, *The Rise of Music in the Ancient World* (1943), p. 41.

[2] "The most fascinating of the oldest melody patterns may be described as a 'tumbling strain'. […] While such fierce haphazard cascades can hardly be transcribed in the neat notation of the West, others, in almost every part of the globe, are less turbulent and at a pinch accessible to our five-line staffs." Curt SACHS, *The Wellsprings of Music* (1962), pp. 51-52.

[3] "Because of the innate capabilities of the human mind, some parameters of sound can be segmented into perceptually discrete, proportionally related stimuli that can then serve as the basis for auditory patternings. In most musics of the world, this is the case with pitch (frequency) and duration which are the basis for melody, rhythm, meter, and (in Western music) harmony. […] I have called these parameters "syntactic". […] Innate cognitive constraints do no, however, segment other parameters of sound into discrete, proportional relationships. For instance, there is no relationship in the realm of dynamics that corresponds to, say, a minor third or dotted rhythm. And the same is true of tempo, sonority, and timbre. […] Because they are experienced and conceptualized in terms of amount, rather than in terms of kinds or classlike relationships […], I have called these parameters "statistical"." Leonard MEYER, "A Universe of Universals" (1998), pp. 8-9

Charles Seeger, in his famous article "Prescriptive and Descriptive Music-Writing", writes that melodies can be considered either as "a succession of separate sounds", "a chain", or as "a simple continuum of sound", "a stream". He adds that our conventional notation is "entirely prescriptive in character", in that it tells us how to make music sound, but not how it sounds, as would a "descriptive" music writing. Seeger apparently associates conventional, "prescriptive" notation with a consideration of music as a chain of separate sounds, segmented in successive, distinct units; and "descriptive" music-writing as showing music in its linear continuum. Now one of the defining features of a language (or of a semiotic system) is its being articulated, i.e. forming a chain of units: Seeger's distinction therefore seems to concern semiotic *vs* non semiotic aspects of music.

He proposes several examples of descriptive music writing, describing the actual sound of music, among which the following (example 1), consisting in automatic graphs of melodic (monodic) music recorded by Alan P. Merriam in the former Belgian Congo. The upper graph shows the linear fluctuations of amplitude (dynamics), from *piano* to *forte*; the graph in the middle represents the variations in pitch. Both graphs are meant to describe the music as it sounds, with a precision that, Seeger says, is better than what human ears can attain. A staff under these two graphs gives a "prescriptive" notation of the same music. Note that the scale at the left of the middle graph is logarithmic: it denotes equidistant degrees of the chromatic scale rather than frequencies of its pitches. This scale and the accompanying horizontal lines actually create a link with what is shown in the staff below, which also places the degrees on equidistant lines – corresponding to a diatonic scale in this case.



Example 1
Charles Seeger, Automatic Graph of Abatutsi Traditional Song
(*Voice of the Congo,* 16), "Prescriptive and Descriptive Music-Writing", plate III

Depending on what one tries to read in these representations, one will note either that the staff notation fails to indicate precisely the fluctuation of the pitches sung, or on the contrary that the middle curve fails to clearly identify the individual pitches of the melody (see in particular the limited distance in the middle curve between what is notated in staff as E♭ or E). The purpose of each of these two representations clearly is not the same. One may note in addition that it seems much easier (for most of us at least, I presume) to imagine the melody by reading the staff notation than by reading the linear graph in the middle. We must therefore face the paradox that a prescriptive notation, staff notation in this case, even if fails to represent

music as it sounds, nevertheless more readily presents a mental image of the sound than descriptive forms of music writing meant to represent sound. This certainly invites a closer examination.

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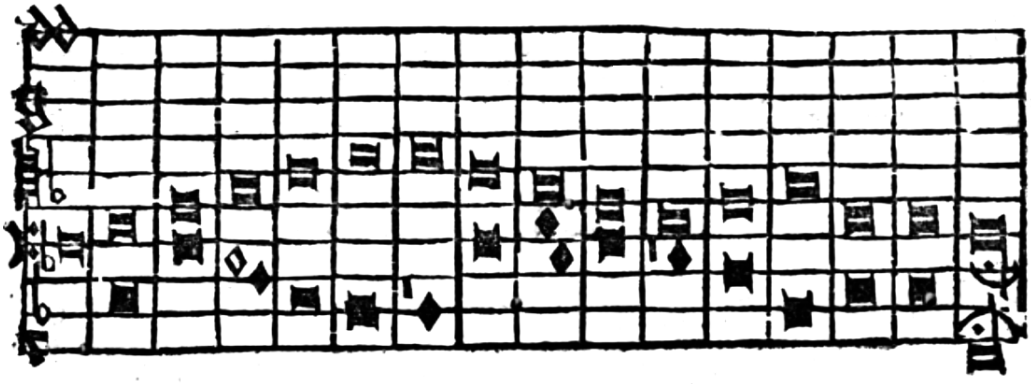
A first point that needs stressing is that our staff notation is fully alphabetic. This is not a metaphor: it is the true meaning of music notation even today. The image in Example 2, from the *Musice active micrologus* of Andreas Ornitoparchus (1517), shows what he calls the *schala decemlinealis*, the "scale of ten lines". Such images are common in the Middle Ages and the Renaissance, but I chose this particular one because it may be the earliest one where the scale is shown without the solmization hexachords. The clefs at the left are letters, *claves signatae*, but they indirectly denote the *claves non signatae*, unwritten letters, so that each line and each space in the staff actually represents one letter, explicitly or implicitly. The notes inscribed on the staff at the right merely indicate which letter is concerned at each moment: the music could as easily have been written in letters, was it not that the note shapes also indicate durations.

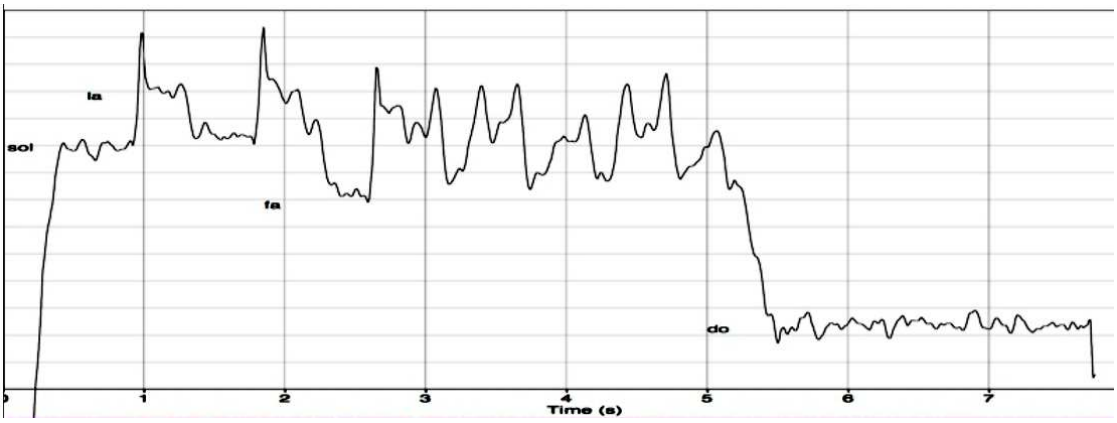


Example 2 – *Schala decemlinealis*
Andreas Ornitoparchus, *Musice active micrologus*, Leipzig, Valentin Schumann, 1517, fol. Liiij r°

The main property of alphabetic writing is that it records what most linguists consider the elementary acoustic units of language, the phonemes. Phonemes are abstractions of different speech sounds ("phones") that are perceived as equivalent in a given language independently of the particulars of their phonic emission. Translated to the case of music, this means that the "notes", represented by letters of the alphabet, or denoted by any specific name (what I mean is that "alphabetic", here, must be understood in a broad sense, not necessary involving the same letters as verbal writing), represent pitches as abstract units of the musical language, perceived as equivalent representations of varying sound utterances. The sounds actually emitted, differing in timbre or even slightly in intonation, are mere "allophones", variants within a single equivalence class.

Let's return to Charles Seeger's representation to see how this works in practice. Example 3 is a modern version, drawn with a more sophisticated software, of the one that had been produced by Seeger. The logarithmic grid behind it is labelled differently, with French instead of English note names, but that is not important: these names stand for letters. The spacing of the lines is similar to that in Seeger's image, which probably means that both were drawn on the basis of frequencies. However, the grid is not disposed exactly in the same position with respect to the curve itself, resulting in a possibly different identification of the pitches concerned. Absolute pitch is of course without importance in this context and it are more precisely the pitch intervals that count. One problem here, in comparison with Seeger's representation in Example 1 is that the interval between the first and the last note, which Seeger read as a diminished fifth from E♭ to A, now appears as a perfect fifth from *sol* (G) to *do* (C): with the alphabetic grid as drawn here, the pitch curve starts slightly under the horizontal line for *sol* and ends slightly above the line for *do*. More important perhaps, it appears difficult to assign pitches to the part of the curve between about 2,5 and 5 seconds, but

that was already the case in Seeger's version (Example 1). Hearing the song might help, but we could not be sure that we all hear it in the same way, which may depend on how familiar we are with fine hearing and fine reading of music – and with the process of assigning pitches heard to categories, to note names.



Example 3
Abatutsi Traditional Song, recorded and published by A. P. Merriam, *Voice of the Congo*, 1954
New graphic representation with the Acousmographe (François Picard, Sorbonne University)

* * *

Let me stress the analytic power of the concepts created to build our Western notation. The first step was the reintroduction, in the *Musica* of Hucbald of Saint-Amand, around 900, of the diatonic scale, as described by the ancient Greeks and recorded in a Latin presentation by Boetius (Example 4). Hucbald claimed that any existing melody could be adapted to this scale – an extremely bold claim. For this, Hucbald said, one only has to correctly position the final of the melody on one of the degrees of the scale. (Finals are located starting from *Paripate ypaton*.[4]) This is the first mention of finals in Western modal theory. The concepts introduced by Hucbald, that of the scale and that of the final, remained of paramount importance in any modal theory – and remain so in tonal theory today.

The next step was the suggestion in the *Dialogus* of the Pseudo Oddo of Cluny to make use of the monochord for reading unknown chants (Example 5). And the last step was the introduction of the staff itself, with its alphabetic clefs, here doubled by the color of the lines, red for F and yellow for C (Example 6). As one can see, this closely resembles adding an alphabetic grid to a pitch curve.

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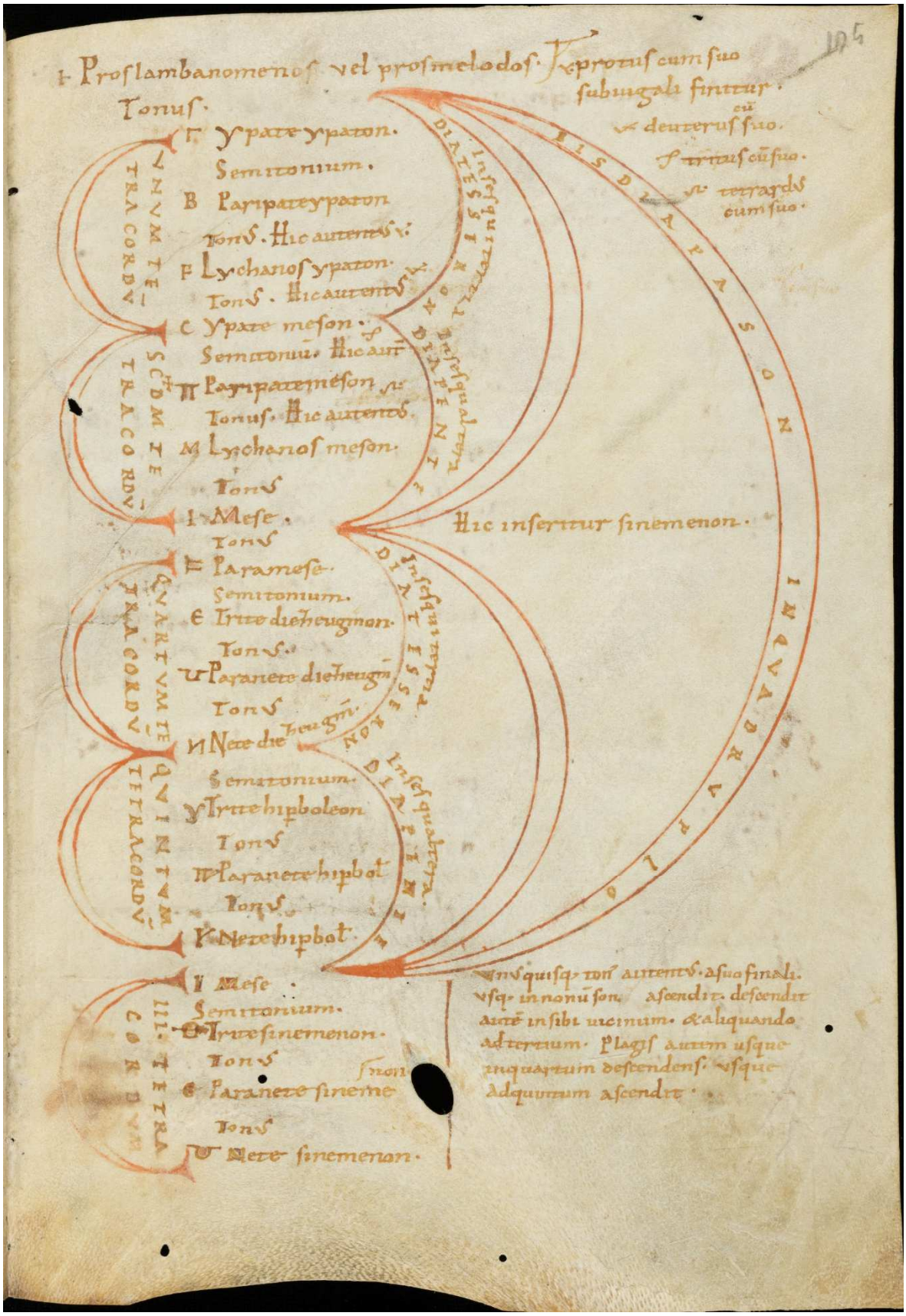
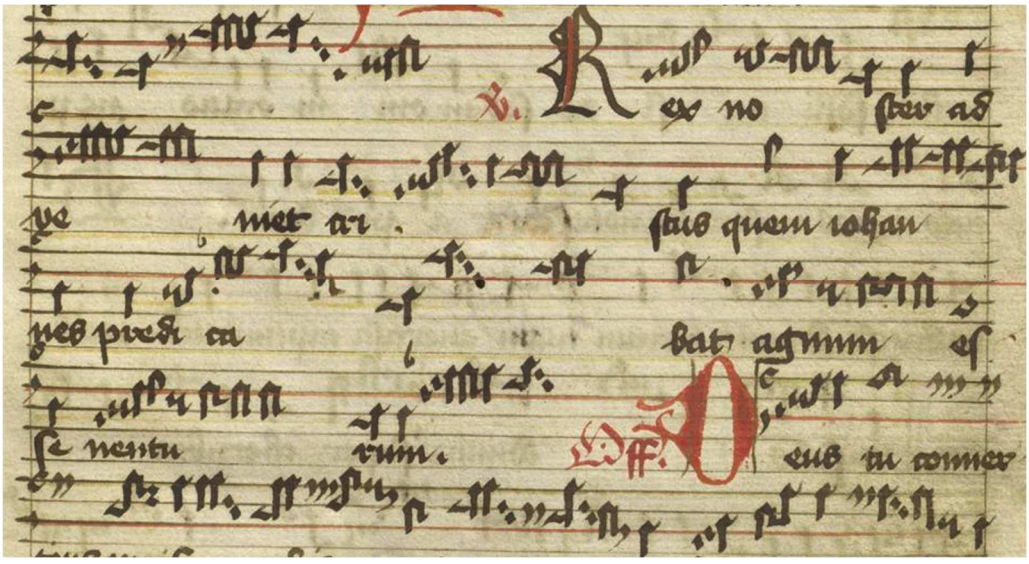
[4] This may not be very easy to read. The figure lists the degrees and the interval between them. At the left, from top downwards, one reads *Proslambanomenos vel prosmelodos*; *Tonus*; *Ypate ypaton*; *Semitonium*; *Paripateypaton*; *Tonus*. At this point begins the statement that interests us: *Hic autem*, then a sign that points to the continuation of the phrase at the top right of the page: *protus cum suo subiugalis finitur*, which means "here indeed / the *protus* and its plagal end". Similar indications are given for the following three degrees, *Lichanos hypaton* (*deuterus*), *Ypate meson* (*tritus*) and *Paripatemeson* (*tetrardus*). Each time, the text mentioning the final is interrupted by the curves describing the intervals of a fourth, a fifth, an octave and a double octave, and continued at the right of the page.



Example 4
Hucbald, *Musica*. Einsiedeln, Stiftsbibliothek, Codex 169 (468)

Example 5
Guido at the monochord
Wien, Österreichische Nationalbibliothek Musiksammlung, Codex Lat. 51, f° 35v



Example 6
Frankfurt am Main, Stadt- und Universitätsbibliothek, Ms. lat. qu. 44
Horseshoe-nail notation

What staff notation does is force us to analyze music as consisting in a chain of distinct units of pitch, much as alphabetic verbal writing forces to analyze languages as consisting in a chain of phonemes. There is nothing "natural" in this, in the sense that neither the pitches nor the phonemes have a physical, "natural", acoustic existence: both are analytical constructs. But these constructs remain essential in most analytic methodologies even today – one could not think, say, of set theory, or of neo-Riemannian theory, without a concept of pitch as elementary unit, as abstract class.

Notations world-wide appear to be of one of two types: neumatic notation and alphabetic notation. Neumatic notation may be considered a notation of the sound fluctuations, but it cannot be read if the melody is not known: at best, it is only mnemotechnic. Alphabetic notation is based on the analytic concept of individual "pitch", the phoneme of music.

What I consider most striking, and I'll leave this as a final consideration and as a possible topic for future reflection, is that alphabetic notations of this kind exist even in cultures which do not know the full alphabet (i.e. signs for both consonants and vowels, as created by the Greek), or even no alphabet at all, for their verbal writing, and where the concept of "phoneme" therefore remains highly questionable – as in China and the far East in general.

Keywords

Score. Staff notation. Analysis. Ontology. Semiotics

References

HUCBALD of Saint-Amand, *Musica*. Einsiedeln, Stiftsbibliothek, Codex 169 (468)

MEYER, Leonard, "A Universe of Universals", *The Journal of Musicology* 16/1 (1998), pp. 3-25.

ORNITOPARCHUS, Andreas, *Musice active micrologus*. Leipzig, Valentin Schumann, 1517.

SACHS, Curt, *The Rise of Music in the Ancient World. East and West.* New York, Norton, 1943.

———, *The Wellsprings of Music*, J. Kunst ed. The Hague, Nijhoff, 1962.

SEEGER, Charles, "Prescriptive and Descriptive Music-Writing", *The Musical Quarterly* 44/2 (1958), pp. 184-195.